FINAL REPORT

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ARRA COGONGRASS PROGRAM
(ALABAMA COGONGRASS CONTROL CENTER)

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I. Executive Summary

Larson & McGowin, Inc. served as the Coordinator of a $6.2 million, 3-year program awarded to the Alabama Forestry Commission and funded by the American Reinvestment and Recovery Act (ARRA) of 2009. The primary focus of this program, being part of the "stimulus bill" signed into law by President Barack Obama, was the creation of jobs to help offset the effects of the economic downturn. Other objectives of the program were to control and slow the spread of the highly invasive plant cogongrass (*Imperata cylindrica* L.) across Alabama using several strategies, engender cooperation among public agencies and private entities, and to provide an example for other states, public agencies, and private organizations in their invasive control programs.

Eligible landowners were encouraged to enroll in the program (called the Alabama Cogongrass Control Center, or ACCC) through multiple outreach efforts. Enrolled properties were placed into 1 of 6 strategies, depending on the property location and other factors. Thirty-one subcontractors documented cogongrass on enrolled properties. Properties selected for herbicide treatment were assigned 1 of 49 licensed pesticide Applicators over 7 companies. Inspectors monitored Applicators to ensure safety and efficacy guidelines were followed. All field staff used a GPS solution customized for this project, and all data were managed through a GIS.

One hundred and sixty-three jobs (FTEs) were created or saved over the duration of the program, far outreaching the original estimate of 75. Over 1,100 landowners across 41 counties enrolled in the program; a majority of these landowners were selected for cogongrass treatment. The ACCC documented 26,194 unique locations of cogongrass covering 2,140 acres on enrolled properties. Sixty percent (15,605) of cogongrass patches covering 788 acres were selected for treatment through the program. Cogongrass acreage treated increased each year of the program (13 ac in 2009, 149 ac in 2010, 503 ac in 2011, and 628 ac in 2012) with a total of 1,293 acres of cogongrass treated over the life of the grant.

II. Introduction

Overview

Cogongrass (*Imperata cylindrica*) is considered one of the world's most invasive weeds, impacting more than 1.2 billion acres worldwide (Holm et al. 1977; Dozier et al. 1998). Since its accidental introduction into Alabama in the early part of the 20th century cogongrass has steadily marched northward from the Mobile area into counties far removed from the coast and into states beyond Alabama's borders (Miller 2007*a*). Currently cogongrass is known to exist in a majority of counties in Alabama due to its diffuse and invasive population dynamics as well as the ubiquitous sites suitable for growth. Cogongrass is difficult to control, and it has a number of vectors with which to spread including anthropogenic and natural. Aside from the worldwide impacts of this species—including the decimation of entire landscape-scale areas in Africa and Asia—cogongrass has crept along rights-of-way (ROWs), in fill dirt, and in the air in Alabama to become an extremely invasive pest whose financial, ecological, and social toll increases daily.

Cogongrass has evolved through the millennia to be a successful pioneer of sites. Cogongrass establishes itself on cutover sites, fallow fields, forests with low under- and midstory competition, regenerated forests, and along ROWs. However, cogongrass is also able to inhabit sites that are currently under intensive management, whether they are pine plantations, ornamental tree farms, nurseries, or farms with no- or low-tillage programs. As a C_4 plant, cogongrass responds best under full sunlight, but it is known to persist in light levels as low as 2% full sunlight (Gaffney 1996, Ramsey et al. 2003). Due to its success in establishment and persistence under many environmental conditions, cogongrass is found in all manner of agricultural, residential, and commercial settings.

Being a grass species, cogongrass is highly adept at moving among sites. In addition to the rhizomes that spread vegetatively, the seeds are very light and can be transported tremendous distances through the wind and on cars, trucks, and farm equipment. Because these plant segments can become attached to equipment as well as moved earth and be moved quickly among areas, the issue is not whether cogongrass will continue to spread but rather its speed and trajectory. Currently one accepted way to adequately control cogongrass spread on a large scale is through (1) preventive means such as cleaning equipment that has been on—and not using soil or fill that has originated from—an infested site and (2) aggressive and repeated chemical applications through time (Shilling and Gaffney 1995; Dozier et al. 1998).

The effect of cogongrass in Alabama is multifaceted and staggering. From an economic standpoint, cogongrass control programs cost public agencies and private entities tens of millions of dollars annually. A recent estimate for eradication of cogongrass in Alabama was $60 million, and a conservative estimate of $7.5 million in annual losses of forest lands[1].

[1] See http://www.se-eppc.org/alabama/alabamacogon.pdf

In addition to the direct financial impact through the need for eradication and control programs, cogongrass fire suppression and prevention requires additional funding each year. Cogongrass burns at a temperature much higher than that of native plants as well as under relatively marginal burning conditions. In Mississippi, fire suppression employees state that cogongrass fires are at least 4 times greater in intensity and speed than that of wildfires occurring in that area (*unpublished data*). At a minimum cogongrass fires burn approximately 20% hotter than that of natural fires in southeastern, pine-based communities (Lippincott 2000). As a result, properties with cogongrass are at greater risk of damage from these types of fires. Agricultural areas and forests can sustain growth delay, injury and mortality in the presence of cogongrass and especially cogongrass fires. With cogongrass occupying ROWs and commercial, residential, and agricultural properties, many unrelated interests are prone to a greater economic risk.

From an ecological perspective, cogongrass profoundly alters plants, communities, and ecosystems. Cogongrass, if unimpeded, will occupy a site to the exclusion of almost all other species. It will displace entire plant and animal communities, including endangered species as well as game- and nongame wildlife. Cogongrass has allelopathic effects whereby plants in proximity will display reduced stem height, leaf length, nitrogen concentration, and radicle length as well as lower survival (Sajise and Lales, 1975; Brook 1989; Bryson and Carter 1993; Casini et al. 1998). Sharp-tipped rhizomes of cogongrass can penetrate the root systems of other plants, damaging or even killing them. The intense fires fed by cogongrass may cause severe injury or mortality in even fire-maintained ecosystems, including those of longleaf pine. This further hampers management and restoration efforts of endangered, threatened, and rare plants and communities. Cogongrass has little wildlife value because of its high silica content and serrated leaf margins which may damage animals who attempt to feed upon it. Small, ground-dwelling animals are displaced by cogongrass due to its little forage value and dense foliage.

An example of cogongrass effects upon species of concern is the federally- and state-listed gopher tortoise (*Gopherus polyphemus*) which depends on an open, grassy understory for its survival. Cogongrass alters gopher tortoise habitat by altering their food sources and disrupting movement patterns (Basiotis 2007). To further complicate the issue, there are legal restrictions as to what management operations can be performed around a gopher tortoise burrow. For example, some means of cogongrass control, e.g., herbicides or disking, are not allowed in the immediate vicinity of the burrow and mound, so the animal is forced to leave that location. The cycle then repeats as the new location cannot be properly managed for cogongrass, further exacerbating the problem.

The social impacts of cogongrass, although indirect and not as easily quantified, also take a toll on the state of Alabama. Money that could be used for social services must be redirected to cogongrass control and mitigation programs. The hunting experience is degraded due to the destruction of wildlife habitat, and smoke management problems arising from wildfire along major ROWs and metropolitan areas may endanger public health. Landowners from underserved areas or those with limited income may bear a relatively greater burden of negative effects with not having adequate financial resources to control unwanted species on their land.

Fortunately, much research, outreach, and educational efforts have been conducted in the last few decades and especially the last 10 years in an attempt to determine how best to control and eradicate cogongrass in the southeastern United States. Cooperatives and memorandums of understanding within and among states, extension officials, public agencies, private entities, and landowners have slowly united under a collective goal of gaining the upper hand on cogongrass. Chemical companies have worked to develop new herbicides that target cogongrass, and many are commercially available in a readily applied form.

Currently there are a limited number of ways in which to effectively control cogongrass, and none are 100% successful at eradication without a sustained effort (Shilling et al. 1995). The chemicals imazapyr and glyphosate, used in combination, has been shown through research and commercial utilization to be the most effective means of controlling cogongrass. Though expensive, chemical application is the one large-scale, commonly accepted, and economically realistic way to control cogongrass. Once cogongrass is detected the landowner will typically contract with a private entity to apply herbicide or perform some other measure of control appropriate to the landowner's objectives. Repeated applications are a necessity for complete eradication of cogongrass. Other means of control, including upturning of soil through disking and judicious use of prescribed fire, augment the efforts of chemical application. Aerial imagery detection through hyper- and multispectral analysis has been met with some success, but to date has not been implemented on a large scale because of the high expense to perform classifications and geographic analysis. When used, the best detection of cogongrass using aerial imagery is from that collected in the summer using trained classifiers that can adequately delineate cogongrass from other warm-season grasses, forests, and other vegetation (Byrd 2007).

Remediation and restoration of sites treated for cogongrass are of importance to prevent invasive repopulation. For example, in some settings planting cover crops (Sanders 2007) or fast-growing grasses and trees (Miller 2007*b*) that fill the niche recently opened by herbicide treatment of cogongrass has been met with success. In ecologically sensitive areas threatened by cogongrass, eradication can actually provide a bridge to restoration by removal of exotics and invasive species and opening the site for establishment by native plants. At a minimum, planting trees and cover crops may help suppress cogongrass growth, enabling target plant species to occupy a site (MacDicken et al. 1997; Miller 2007*b*).

There has been substantial work on understanding the biology and genetics of cogongrass as well as controlling it. However, cogongrass continues to spread throughout Alabama and indeed the southeastern US. A variety of cogongrass, thought to be a non-invasive form, is still commercially sold in the northern tier of the US. In Alabama, there has been some success in combating cogongrass, and new tools are available to persons specifically interested in invasive control. In 2007 the Alabama Forestry Commission developed a dynamic mapping tool with funding for a USFS redesign grant. This tool was created for use by the general public, displaying locations of cogongrass infestations documented by the AFC. With this tool a user can assess if a known location may affect their property and inform the AFC of new infestations. The University of Georgia Center for Invasive Species and Ecosystem Health developed a website to allow the general

public to document where invasive species have been observed and treated (the Early Detection and Distribution Mapping System, or EDDMapS). However, there was a need for a more unified approach to keep track of all cogongrass-related data whether related to detection, control, or restoration efforts.

Development of Cogongrass Programs in Alabama

A single program that united the successful aspects of research, education, science, and policy was deemed necessary by a Memorandum of Understanding signed by representatives of several state and federal agencies and private industry in 2007. A proactive, three-pronged approach to cogongrass control using prevention, intervention, and restoration methods was seen as an approach that might tackle the increasing cogongrass problem in the state of Alabama. Prevention would lessen the probability of spread through education and strengthening of ingress and egress vulnerabilities; intervention would control or eradicate cogongrass infestations; and restoration would lower the probability of reoccupation while rebuilding native structure and function. Recent technological advances streamlined measures of detection, application, and monitoring. These methods, if used simultaneously, would maximize the financial impact of a cogongrass treatment program. A statewide program would allow for not only the attenuation of the negative effects of cogongrass across Alabama but provide much-needed jobs for its citizens.

Miller (2007*a*) described an "Adaptive Collaboration Restoration" approach as a way to build upon strengths of current programs and technologies and incorporate existing networks in order to control the spread of cogongrass and rebuild lost ecosystem function. However, this approach had not yet been fully implemented on a large scale.

In 2009 President Barack Obama signed the American Reinvestment and Recovery Act (ARRA), a $787 billion bill that would have immediate and long-term impacts on millions of Americans. The US Department of Agriculture Forest Service received $1.15 billion from the ARRA to support a suite of projects, including wildland fire management, utilization of biomass, and many others (Charnley et al. 2011). The state of Alabama received $16.6 million in funding for Alabama or multistate projects, $6.2 million of which went to a program to fight cogongrass. A request for proposals was made available to the general public, and in August 2009 a private company (Larson & McGowin, Inc. of Mobile, AL) was selected to coordinate the state program in conjunction with the AFC. The program used the principles described by Miller (2007*a*) to create a long-term, successful program that could be implemented in other regions of the US and serve as a model for other invasive pest programs around the world. The program was given the operational title of the Alabama Cogongrass Control Center (ACCC).

The overall goal of the ACCC was to create and maintain Alabama jobs and combat the spread of cogongrass in the state of Alabama. The specific goals outlined in the proposal were to:

1. Create and maintain Alabama jobs and stimulate local economies

2. Fight the spread of cogongrass through a multidisciplinary, concerted, and aggressive program
3. Restoration of ecosystem function on sites where cogongrass has been controlled or eradicated
4. Establish and maintain a framework of industry, government, and private landowners
5. Create a system of success that is scalable, agile, and creates additional funding opportunities

III.Program Structure

Organizational Structure

In the 2009 proposal from Larson and McGowin, the ACCC was designed as having 4 departments: Administration; Survey and Consulting; Auditing; and Applications. The original intent was to have one supervisor for each department with clearly designated responsibilities and roles. These supervisors were to be Larson and McGowin employees so that communication among departments would be maximized. For the Administration department, Ernest Lovett was the supervisor (and overall Project Coordinator). For the Survey and Consulting department, Stephen Pecot was the supervisor. The Auditing and Applications departments were combined into one department early on in the program because there was no need for an Audit supervisor the first year. Will Autrey was assigned the role of supervisor for the Audit and Application departments.

Each supervisor (Mr. Lovett, Mr. Pecot, and Mr. Autrey) oversaw several dozen independent subcontractors. Mr. Pecot supervised 26 subcontractors that first documented the cogongrass locations (hereafter referred to as "Scouts") and oversaw the work of 10 Geographic Information Systems (GIS) and database administration subcontractors. GIS subcontractors were employed by or subcontracted with Silvics Solutions LLC of Birmingham, AL. Database administration was handled by 1 Larson & McGowin employee (Ms. Sirmon). Accounting services were provided by 1 Larson and McGowin employee (Mrs. Allen) who worked with AFC employees to process invoices and disbursements.

Mr. Autrey oversaw 7 companies (49 individuals) that worked as independent subcontractors performing herbicide application duties (hereafter referred to as "Applicators"). Additionally, 5 subcontractors were supervised by Mr. Autrey as auditors/inspectors of the Application department ("Inspectors"). The audit/inspection subcontractors varied from year to year between AFC employees and independent subcontractors.

Several companies provided miscellaneous services throughout the life of the grant. Tri-Global Technologies, LLC (Athens, GA) was the primary supplier of GPS units and software used for field data collection. Construction Safety Products, Inc. (Shreveport, LA) supplied the custom flagging used by field subcontractors for marking documented and treated cogongrass patches. MH3 Printing (Mobile, AL) provided printing and mailing services for the landowner information packet.

A website was created early in September 2009 that served as a clearinghouse of information throughout the life of the grant. This website was visited nearly 10,000 times (5,062 unique visitors) in 50 countries. The top 2 countries visiting the website were the US (94%) and the Philippines (4%). The website was designed as a vector for the latest information, including links to all available articles about the ACCC published online and a blog. The website also served as a source for enrollment forms and other project information. Links to more information and an ACCC Facebook page was added in 2010.

Changes to Organizational Structure

There were 2 major modifications to the ACCC organizational structure for the duration of the grant. These revisions were necessary to help the program reach more participants and to better meet project goals. Stephen Pecot continued to be the Survey and Consultant Supervisor but was also designated as the Communications Director in 2009. This allowed the ACCC to focus on reaching more of the target audience for the program, i.e., private non-industrial Alabama landowners. Mr. Autrey supervised the Application and Audit departments in 2010 and 2011. In 2012 the ACCC selected Joey Van Dee, one of the original Scout contractors, to oversee the Inspection department. This allowed Mr. Autrey to focus on the Application department which had become expansive and difficult to manage with a half-time appointment.

Legal and Policy Groundwork

As a private company Larson & McGowin has practiced good business principles. This includes the drawing of contracts that protect parties that enter into agreements. At the beginning of the grant Larson & McGowin met with their attorney to discuss the need for a set of binding legal agreements specific to the grant. These agreements would indemnify Larson & McGowin and any subcontractors that performed work on behalf of the ACCC. These documents included a landowner access agreement and contracts between Larson & McGowin and the independent subcontractor. Every landowner (or their legal representative) that participated in the program was required to sign the access agreement which allowed the ACCC and its subcontractors legal access to a property (Appendix 1). It also indemnified Larson & McGowin and any subcontractors from any wrongdoing while on the property.

The agreement between Larson & McGowin and the independent subcontractor was a standard contract that Larson & McGowin used for their normal management work. It was modified slightly by an attorney for the ARRA grant. This agreement required that all subcontractors maintain a minimal level of liability insurance and, where appropriate, workman's compensation insurance. These records were provided to Larson & McGowin prior to a subcontractor beginning work. A hard copy was kept on file at the Larson and McGowin Mobile office.

In addition to legal agreements, a Program Guidelines document was created that described the program and strategies in detail. This document went through 3 revisions and was posted to the

ACCC website in 2009. It was also made available upon request to any participant in the ACCC. A copy of the Program Guidelines is included in Appendix 2.

Having these agreements on file proved to be a wise investment of time and resources. Larson and McGowin used legal agreements as good business principles, but as it turned out spending time at the outset of the grant developing and improving legal agreements and standard operating procedures were critical for the success of the ACCC. If Larson and McGowin had not been insistent on requiring these details there may have been numerous issues created for Larson and McGowin, the AFC, subcontractors, and the ACCC in general. By implementing a good rules structure combined with the GPS/GIS and data accountability, potential lawsuits were thwarted and a fair relationship was created between the ACCC and the landowner.

Data Management

GIS – In order to best manage the data acquired during the life of the grant Larson and McGowin worked with Silvics Solutions to create 2 databases that would contain project information. The first was an online landowner database that was available to all persons affiliated with the ACCC that required this type of access. This database contained all the information that was filled out by the landowner on the enrollment form. A scanned PDF of the form was attached to the record, which enabled subcontractors to obtain the information remotely via an internet connection. This was especially useful during spray season as the subcontractor could quickly print the access agreement for a specific landowner. Landowners were asked to submit multiple forms if there were several large tracts or more than one county involved. In hindsight, having a single record for each landowner and county would have been a better approach as documenting and managing tract ownership became very difficult. The implemented approach made accounting for the number of landowners in the database inaccurate.

The second database was a GIS (using the application Integrated Forest Management System, or IFMS, licensed by Silvics Solutions LLC) that contained the data associated with individual cogongrass patches and their treatment. These data were imported into IFMS from the field GPS units and then managed via folders within the application.

There were 4 primary layers of information in the GIS: an ownership tract layer, documented cogongrass, treated cogongrass, and access routes. Other layers of information provided a higher level of processing efficiency. For example, the ACCC assembled a master parcel layer from Lanworth, Inc. (Chicago, IL) based on individual counties where this information was available (31 counties). The GIS automatically imported the parcel boundary for a property if it was available in this master layer. Otherwise, GIS staff drew in boundaries. This is vitally important to note as some records in the ownership tract layer do not reflect in any way true boundaries. There were 36 counties where ownership parcels were not available, including: Autauga, Barbour, Bullock, Butler, Cherokee, Choctaw, Clarke, Clay, Cleburne, Coffee, Colbert, Conecuh, Covington, Crenshaw, Cullman, Dale, Elmore, Etowah, Franklin, Geneva, Jackson, Jefferson, Lamar, Lauderdale,

Lawrence, Lee, Limestone, Lowndes, Marshall, Monroe, Montgomery, Morgan, Randolph, Shelby, Tuscaloosa, and Washington.

The ownership tract layer (named s02099tracts in the GIS) contained the tract name (automatically created by IFMS), tract owner (assigned by the GIS staff), a primary key (9-digit number), and numerous other fields (Table 1). The documented cogongrass layer (named s02099stands in the GIS) contained all locations of cogongrass documented by Scouts that had cleared quality control checks. Table 2 contains all data fields that are in this layer of information, many of which were entered in the field by the Scout or automatically determined by the GPS unit. The treated cogongrass layer (named d02099CgTreatments in the GIS) contained all locations of cogongrass that were treated by Applicators and cleared quality control checks. Table 3 contains all data fields that are in the treated cogongrass layer. Since the GIS operated as a relational database, each layer had a primary key field that allowed a feature to be examined relative to the other layers that overlapped that feature.

GPS – Field data collection was made possible with the deployment of GPS mobile units to every Scout and Applicator. The Inspectors used paper forms because so little data was recorded. Scouts used a Trimble Juno SB which is a GPS unit with the Windows Mobile CE operating system. A custom application (Forest Utility Suite) created by Tri-Global Technologies allowed for the collection of spatial and tabular data. Each Scout collected 32 pieces of data, including the location and size of the cogongrass patch, the herbicide recommendation, and other observations. The Scouts were instructed to collect a single GPS point in the center of the patch if the total size was smaller than 0.1 acres. With these small patches Scouts chose the size through the GPS application. This was implemented because of the accuracy of the GPS units, which is typically around 10 meters. For cogongrass patches larger than 0.1 acres the Scout collected a polygon shape by traversing the boundary of the cogongrass in a clockwise motion. With the polygon record a more reliable acreage was calculated by the GIS.

The Applicators used a Getac PS535f unit for collection of cogongrass treatment data. This unit had the Windows Mobile operating system installed but used the same Forest Utility Suite application as the Scouts. Each Applicator collected 50 pieces of data, including the exact boundary of the herbicide applied, how much herbicide mixture was sprayed in gallons, and many other pieces of information. Unlike the Scout, the Applicator collected a polygon for every patch regardless of size. In some cases, the Applicator sprayed multiple cogongrass patches (as documented by the Scout) as one patch. This was done when it was determined the herbicide applied to one patch would cross paths with that of another treated patch.

The GPS application had repeat functionality enabled for several fields. By adding this feature the subcontractor was able to quickly move among patches and enter data quickly. For example, in many cases the weather and soil conditions were identical in a field setting. The user could enter all the appropriate information in the first record and have that data copied over for subsequent records without having to re-enter identical data. This greatly increased efficiency for some areas.

Financial Data Management

It was critical to maintain active involvement with the day-to-day aspects of the ACCC. The Survey and Consultant Supervisor and the Spray Supervisor kept in constant communication with the Scouts and Applicators. In addition, the ACCC worked closely with the Accounting staff at Larson and McGowin and the AFC to keep a constant pace of invoice processing, submittal, and disbursements. To that end Larson and McGowin used accounting software and record-keeping systems specifically designed for maintaining the vital flow of financial data. With the accounting software Larson and McGowin was able to monitor time and expenses relative to the entire project in a highly detailed manner. In addition, a process was developed at Larson and McGowin to ensure invoices were approved by the proper ACCC supervisor, entered and processed by Accounting staff, and sent to AFC in a timely manner. When disbursements were received by the AFC, Larson and McGowin processed payments and cut checks quickly.

ACCC Strategies

There were 6 operational strategies within the ACCC, each with differing funding levels, selection criteria, and treatment acreages per landowner. Each strategy occupied different geographical areas with some overlap. Strategy #3 (Underserved/Limited Income) overlapped with several counties for Strategies 2, 4, 5, and 6. Strategy #5 (G1/G2) included the entire state. Table 4 provides a summary of the properties selected and the maximum acreages treated by strategy. Figure 1 shows the distribution of the strategies statewide. Figure 2 shows the enrolled properties statewide. The total number of landowners assigned to each strategy varied widely and was completely dependent on the location of the property. Some strategies had enrollment far below what was expected at the outset of the grant.

Some strategies were designed to treat all documented patches, such as Strategies 1-4. In Strategies 5 and 6 only a subset of properties were selected based on several factors. However, in Strategies 1-4 (and in some cases Strategies 5 and 6) some patches were not sprayed for 3 primary reasons. First, some properties were pulled from selection due to the landowner not meeting eligibility criteria or their expressed intention to treat the cogongrass themselves. This occurred in a small handful of properties. When this occurred these records were flagged as inactive and prevented from being assigned for treatment.

Second, documentation by the Scouts continued until July 2012, far after properties had been selected by the ACCC and assigned to spray subcontractors. The ACCC wanted to ensure any selected cogongrass patches would receive the necessary multiple treatments if at all possible. For properties added late in the program, i.e., after Summer 2011, there was no way to have these properties treated more than once. Therefore, newly documented patches that would only receive 1 treatment prior to the end of funding were barred from selection. This is evident in the comparison of documented and treated patches for Strategy #1.

Third, in some cases there were data issues that prevented some records from being imported into the GIS database. The net result is that the percentage of properties selected was lower in some strategies than that originally planned (Table 4, Figure 7).

An examination of each strategy's enrollment is warranted. The statistics presented here are reflective of all quality control checks. Because of some minor data issues 569 records are omitted from the summary. Table 4 is a summary of the information discussed in the next section.

Strategy #1 (Detect and Eradicate; $1,000,000 allocated): There were 261 properties eligible for this strategy (Table 4). Of these properties, a total of 6,421 patches were documented in this strategy (24% of the total). Of the documented patches, 90% (5,755) were selected for treatment, with the 10% not selected for reasons previously outlined. In early 2010 the ACCC was concerned that there would not be enough money to treat all landowners in this strategy. This was reflected in the data that had been collected by Scouts from September 2009 – March 2010. Therefore, in 2010 the boundary was moved to US Highway 82 from Montgomery to the Alabama-Mississippi state line. The boundary stayed the same east of Montgomery to the Alabama-Georgia state line. At the end of 2010 it was determined the movement of the strategy boundary was unnecessary, and the ACCC moved the boundary between strategies #1 and 6 back to US Highway 80. This boundary stayed the same for the rest of the program.

Strategy #2 (State Borders; $600,000 allocated): There were 41 properties eligible for this strategy (Table 4). Of these properties, a total of 634 patches were documented in this strategy (2% of the total). Of the documented cogongrass, 72% (457) were cleared and selected for treatment. Enrollment was far below that originally anticipated for this strategy. The ACCC made a thorough attempt to reach landowners that would fall under this strategy. To allow more landowners to be selected the ACCC expanded the boundary of this strategy from 0.25 miles to 1 mile from the state border in 2010. This incorporated several more properties but was still less than originally anticipated.

Strategy #3 (Underserved and Limited Income; $500,000 allocated): There were no landowners eligible for this strategy. This may have been due to overlapping strategies that had already selected these landowners. However, because of the low enrollment in some counties the ACCC determined it could treat nearly all properties that fell geographically under this strategy, barring data issues or the landowner spraying the cogongrass themselves.

Strategy #4 (Stop the Spread; $300,000 allocated): There were 36 properties eligible for this strategy (Table 4). Of these properties, a total of 2,060 patches were documented in this strategy (8% of the total). Of the documented patches, 95% (1,949) were cleared for treatment. In this strategy all landowners were selected except in cases previously described. The initial boundary for this strategy was 5 miles south of US Highway 80 running from the MS to AL state lines. In early 2010 the ACCC was concerned that there would not be enough money to treat all landowners in strategy #1. This was reflected in the data that had been collected by Scouts from September 2009 – March

2010. In 2010 the boundary was moved to US Highway 82 from Montgomery to the Alabama-Mississippi state line. The boundary stayed the same east of Montgomery to the Alabama-Georgia state line. Because of this change the boundaries of strategy #4 were altered.

Strategy #5 (G1/G2 Habitat; $10,000 allocated): There were no documented patches for this strategy. The ACCC trained the Scouts to examine every property for areas where cogongrass might be negatively affecting threatened or endangered species, but none were found.

Strategy #6 (Landowner Select; $2,752,900 allocated): There were 807 properties eligible for this strategy (Table 4). Of these properties, a total of 17,147 patches were documented in this strategy (65% of the total). In this strategy a selection process was implemented due to the sheer volume of known cogongrass patches in the covered region. Of the documented patches, 51% (8,754) were selected for treatment. As in strategies #1 and 4, the region covering strategy #6 was changed in 2010 to better reflect what was observed in the Scout data (US Highway 80 to US Highway 82, Montgomery to MS state line). In 2011 the boundary was moved back to US Highway 80. As in the other strategies, there were more data being imported into the GIS after assignment to sprayers had already occurred. Also, errors and issues with a few GIS data records prevented some data from being fully imported and used.

Landowner Enrollment

A discussion of how a participant navigated the program is useful to understand the intricacies of implementation. The basic eligibility for the ACCC was to be the owner of an Alabama property that is held in private hands and operates in a non-industrial, i.e., timber industry, fashion. Any publicly owned properties, e.g., county roads, were ineligible for the program. Eligible properties had an additional requirement that precluded any acreage currently receiving federal or state funds for cogongrass control. Therefore, a landowner receiving Conservation Reserve Program (CRP) funds for reforestation work on their property was not an automatic disqualification.

Eligible landowners enrolled in the program by completing a 2-page form. This form went through 6 iterations in 2009 and 2010 before a final version was accepted (Appendix 3). The form contained sections that would provide the ACCC with contact and general property information along with detailed cogongrass and past cogongrass treatment information. The main objective of this form was to obtain contact information but also to learn about where the cogongrass may be located on the property. In addition, the form required landowners to provide details about any previous herbicide treatments that may have been done, including treatments funded by government cost-share programs. Landowners expressed satisfaction at having a simple, short form to complete for enrollment. The ACCC took steps to ensure this information was kept private (a password-protected database) yet available to all those working for the program through internet access.

The landowner's enrollment form was entered by the Administrative Assistant at Larson and McGowin or the subcontractor that provided the form to the landowner. When completed, the Survey and Consultant Supervisor assigned the landowner to a specific Scout subcontractor. The

record was also assigned to 1 of 6 strategies, depending on the property location and other factors. The Scout would contact the landowner to agree on a date and time to visit the property. In many cases the landowner or property manager would meet the Scout at the property the first day and give the Scout a key to the gate. The Scout would usually keep this key in their possession since the herbicide Applicators might need it. If so the Scout retained the key and returned it at the end of the program. Sometimes access was unfettered once the Scout determined property boundaries. The Scout would use a GPS unit (Trimble Juno SB) to document cogongrass as they came across it, collecting several dozen pieces of information at each location. The Scout would typically start at areas where there had been recent harvesting or planting operations. Google Earth was also helpful for viewing a property prior to site visits.

The duration spent on each property varied widely, from a few minutes to several days to weeks. This was entirely dependent on the size, cover type, and topography of the property along with weather and unforeseen circumstances. Scouts were trained that when enough cogongrass had been documented to meet the maximum acreage allowed for that strategy they were done. In most areas of the state Scouts did not reach this threshold. In southwest AL, however, there were numerous properties that had cogongrass acreage far exceeding the amount that could be sprayed per property by the ACCC. In these infrequent cases the Scout contacted the landowner, described the situation, and gave the landowner the option of having certain areas prioritized through documentation.

The Scout uploaded the GPS data when connected to the internet. This made the data transfer process extremely efficient as no data or equipment had to be sent via regular mail. A week's worth of work could be uploaded to the cogongrass server at the Larson and McGowin office in less than 5 seconds. This is in stark comparison to the pilot work performed in September-October 2009, prior to deployment of the Trimble Juno SB units. In the pilot work Scouts were relegated to using a basic GPS unit (Garmin eTrex) and paper forms. Prior to the deployment of the Trimble GPS units and the GIS server the Scouts or GIS subcontractors were spending 10-12 hours per week performing data entry into an online database or an Excel spreadsheet; this was cut down to less than 5 seconds (an 8,000-fold increase in productivity).

GPS data were processed via GIS subcontractors at Silvics Solutions using IFMS. IFMS was customized to meet the demands of the ACCC, allowing for new import routines of spatial and tabular data. There was a critical need for a half-time subcontractor to process incoming data from Scouts and eventually Applicators. The estimate is that an FTE would be required if Scout data were being sent daily from 10 subcontractors, though this varies widely depending on the Scout's ability with a GPS and a GIS analyst's expertise.

Landowner Selection

With strategy #6, landowner selection was based on their individual calculated composite score and the cost to treat the documented cogongrass. Each county was treated as its own population, where landowners were sorted by their composite score in descending order. A separate analysis was run in May 2011 at a statewide level to obtain the proportion of cogongrass documented in a county

relative to the entire state database. The budget for a strategy was then applied to each county based on that percentage of the state total. For example, there were 4,042 cogongrass records in Monroe County, which was 24% of the total for Strategy #6. Therefore, 24% of strategy #6 funding would be allocated to Monroe County (called "County Fund").

In May 2011 the landowner composite score analysis was calculated for all existing data in strategy #6. Scouts were continuing to document cogongrass, but the ACCC had to demark a point in time where selection would occur. A complex spreadsheet was created that extracted landowner enrollment and cogongrass data from the landowner online database and the IFMS SQL database. A series of worksheets and pivot tables allowed for the calculation of submodule scores that incorporated landowner responses to questions on the enrollment form, GPS estimates of cogongrass on the property, the amount and type of herbicide prescriptions, proximity to water, and several other factors. Table 5 contains the landowner composite score tabulation along with statistical weights applied to each factor. In addition, herbicide application cost estimates (provided by several Larson and McGowin employees) were applied to the cogongrass data to arrive at a financial cost to treat cogongrass estimate.

The list of processed landowners for a county was sorted in descending order by composite score. Starting with the highest composite score for a county, the cost to treat each property was accrued as each successive landowner was added until the County Fund was reached. No landowners were selected after that point.

When landowners were selected for treatment a detailed process was followed in IFMS to ensure that landowners were not omitted. Selected cogongrass records were placed into a data folder in IFMS with the county name, regardless of herbicide treatment. Once all selected records were added to the folder, e.g., "Selected_Baldwin", individual cogongrass records in that folder were again split up by herbicide treatment (glyphosate, imazapyr, or aquatic glyphosate), e.g., "Selected Baldwin GL", "Selected Baldwin IZ", and "Selected Baldwin AG". By organizing the data 2 ways it was far easier to locate and assign individual cogongrass patches or landowners to an herbicide Applicator.

IFMS was customized to allow for treatment data to be packaged from the data folders into an XML format that was read by the GPS unit application. In addition, shapefiles were created so that subcontractors who preferred to use a Garmin eTrex could have the data if necessary. As with the Scout upload process, the transfer of GPS data to the Applicator GPS units was expedited. Selected data were exported from IFMS to an Excel spreadsheet and joined to the new shapefiles in ArcMap. A GIS subcontractor then made 8.5" x 11" maps for each property that contained the exact point of a selected cogongrass patch (color-coded by herbicide), the identifier (xxxxx-xx-xxxx, or landowner-herbicide-spotnumber), and landowner information.

Cogongrass Treatment

Applicators were grouped by company and assigned a particular county. The ACCC tried several approaches to implementing a large-scale herbicide treatment program between 2009 and 2012. In

2009 and 2010 there was little enough data that issues with multiple spray companies did not exist. In the 2011 spray season the ACCC assigned cogongrass patches for treatment by herbicide treatment to a particular crew, but it was found to be more of a nuisance than a help for several reasons. First, the landowner was under the perception that when the Applicator arrived that all cogongrass would be sprayed. However, in 2011 the Applicator crew would spray one type of herbicide and then leave. Several landowners expressed dissatisfaction as the Applicator would leave after spraying only a few patches even though the Applicator would return to the property another day. Second, the intention was to maximize safety and minimize error where the incorrect herbicide was applied. This, however, created more problems as Applicators were not able to truly document where they had been.

In 2012 the ACCC modified its approach to herbicide application. The amount and type of herbicide did not change, but an Applicator company was given *all* selected cogongrass data for a county at one time, regardless of herbicide. By doing so the individual company was given the flexibility to assign crew members to a landowner or an herbicide. The focus was more on staying on one landowner's property until all selected cogongrass was treated. This approach was more successful, and landowners were more satisfied with the approach.

Table 3 lists the exact data that were collected by Applicators for every cogongrass patch. Many of these data were exported in IFMS from Scout data and were read-only fields displayed for the Applicator. As with the Scout, the Applicator was required to document the boundaries of the cogongrass with a GPS. The difference is that the Applicator documented the area that was sprayed, which may have been wider than the actual cogongrass patch. With glyphosate and aquatic glyphosate the Applicator only sprayed the cogongrass, whereas with imazapyr they sprayed a band 6-10 feet further than the cogongrass margin.

Because of the inherent error in GPS accuracy (~10 m), there were many instances where the Applicator had difficulty finding the *exact* cogongrass patch that was originally documented by the Scout. Because there were ultimately 2 GPS units involved (Scout and Applicator), there could be as much as 20 m difference between the expected locations of a cogongrass patch. This made finding individual patches difficult, especially on sites with many patches in a confined area. In addition, cogongrass patches changed size or shape between the time originally documented and when sprayed. New or missed patches were also commonly seen by the Applicator. This occurred for several reasons, but the most likely is that cogongrass can be easily missed at certain times of the year. In some cases the landowners educated themselves about cogongrass and looked for the plant on other parts of their property.

Inspections

Inspections of treated cogongrass patches occurred from the pilot work in 2009 until the very end of spraying in July 2012. The initial inspections in 2009 and 2010 were basic and focused on safety. In 2011 and 2012 the ACCC implemented a more formal inspection plan with written records collected by subcontractors.

IV. Program Accomplishments

Job Creation

The amount of jobs created or saved (in Full-Time Equivalents, or FTE) far exceeded the initial estimate at the outset of the grant. It was anticipated that 75 FTEs would be generated through the $6.2 million grant. As of September 7, 2012 the ACCC had created or saved 163 FTEs, more than double the original estimate (Table 6). There are several reasons for this. The most likely reason is the tremendous savings in time when the GPS and GIS were implemented. There was a savings of more than 50% by recording information in a GPS unit and having it automatically imported in the GIS. Another source of savings was by using private subcontractors that were qualified to do the work. In many cases the subcontractors were Registered Foresters with experience in documenting and treating cogongrass. This lowered training costs. Third, the ACCC assigned subcontractors to areas close to their home, which minimized excess mileage costs. Fourth, because of the GPS units the ACCC was able to monitor the work that was being conducted closely. Any issue with efficiency or safety was quickly addressed, and if a subcontractor needed to be replaced no time was wasted. Finally, because the ACCC utilized local and experienced subcontractors they had an interest in ensuring the program was a success. Their comporting with the grant objectives was reflected in their productivity and the willingness of landowners to participate in a government program.

Tables 7 and 8 are monthly summaries of hours worked by each subcontractor. Because subcontractors were independent, and in some cases had other employment, their hours worked each month varied widely. Larson and McGowin, as Coordinator, maintained a steady level of work over the grant's existence, accounting for 12% of the total reported hours for the grant (Table 7).

Data Management System

One of the major strengths of the ACCC was the development of an integrated database of information regarding landowners and cogongrass in the state. Prior to 2009 the largest database of cogongrass in Alabama was created and managed by the AFC. The AFC database contained cogongrass locations documented by state employees in addition to locations submitted by the Alabama Department of Transportation (ALDOT) and the US Forest Service. Private landowners and companies collected and maintained their own data with little to no sharing of information.

During the proposal process Larson and McGowin was well aware of the need to have a data solution that provided a comprehensive approach to collecting and managing data from several sources. The decision to standardize collected data greatly assisted data processing. Using the same software and only 2 GPS models made troubleshooting issues easier. Standardizing the data form and working closely with members of the Alabama Cogongrass State Task Force Technical Committee helped the ACCC to ensure the best data was being collected. And utilization of a single GIS application (IFMS) with a SQL database greatly helped in the long run, allowing for system-wide checks and changes when necessary. The final GIS database was quite large—2.4 GB—which would have been a problem if other GIS formats had been used, e.g., shapefiles only, geodatabases,

etc. The GIS was deployed between the Silvics Solutions office in Birmingham and the Larson & McGowin office in Mobile. The Birmingham location housed the central server, and the Mobile office housed a field server. Since these were networked, any changes that the GIS staff made in Birmingham were sent to the field server in Mobile and vice versa. GIS staff accounted for 4% of all hours reported for the grant.

The separation of duties with respect to data had significant positive impacts on the efficiency of data creation and management. Once the field staff had submitted their data, the GIS staff at Silvics worked to import the data into the GIS. This staff was also critical for conducting much of the quality control checks, fixing many of the topology issues that arose with the collection of GPS data. The Survey and Consultant Supervisor assigned the selected cogongrass records to the individual Applicator and managed the data that was exported to them. Another GIS staff member created the maps that the Applicators used when on a property. The Spray Supervisor worked with the Applicators to troubleshoot issues that arose in their field duties. Finally, the GIS staff at Silvics Solutions provided overall technical support to the Scouts, Applicators, and the ACCC. Having this clear separation of duties enabled the individual to perform their assigned duties efficiently.

Cogongrass Documentation

A total of 26,831 cogongrass patches were documented by the ACCC over the life of the grant (Table 9). Of these, 569 records were either deemed to be on non-enrolled or ineligible properties. Thus 26,262 records were linked to 1,145 eligible properties across 37 counties in Alabama (Table 10). The distribution of cogongrass across the state followed closely with that documented by the AFC through a USFS redesign grant, with most of the cogongrass in the southwest corner of the state. Maps showing the locations of cogongrass by number of patches and total acreage per county documented by the ACCC are provided in Figures 3 and 4, respectively. The average patch size at each county varied widely, with the largest average patch size in Mobile County. Interestingly, relatively large patch sizes were also observed in the south-central portion of the state (Figure 5). Why the patch size differed among counties is worthy of further study. Scouts accounted for 46% of all hours reported during the life of the grant.

The distribution of cogongrass shown in Figures 3-5 should not be construed as the true distribution of cogongrass, since the ACCC data was purely a function of how many landowners enrolled in a particular county and the number of Scouts in that area. For example, Mobile County is the introduction point of cogongrass in the United States yet only 1,506 patches were documented. This is far below the 4,042 patches documented in Monroe County, 60 miles to the northeast of Mobile. In this comparison only 2 Scouts were active in Mobile County from early 2011, whereas in Monroe County 5 Scouts were active from mid-2010. In other words, this is not a statistically based sample of cogongrass in Alabama and should not be construed as such.

The locations of cogongrass patches revealed significant patterns of the cover type in which cogongrass is found. Most cogongrass was documented in loblolly pine plantations (34%), followed by open fields (29%) and mixed pine-hardwoods (13%) (Table 11). Based on acreage, however, the

open fields and mixed pine-hardwoods were nearly identical (406 ac vs. 419 ac, respectively). This was a result of differences in the mean patch size, which varied greatly by location and cover type (Table 11). Interestingly, the largest mean patch size was in slash pine plantations (0.33 ac) followed by all other pine-based forests. The fact that the largest patch sizes were in pine forests may have implications for future cogongrass programs and land management in general.

At every cogongrass patch documented by a Scout, an herbicide prescription was recorded. Three herbicide prescriptions were used for the grant: aquatic glyphosate, glyphosate, or imazapyr. A "No Treatment" prescription was also available for areas where it was not prudent to apply herbicide. The ACCC created a dichotomous key to select an herbicide based on cover type and proximity to water. This key received valuable feedback from members of the Technical Committee and was provided to each Scout and Applicator. The Scout made the initial determination of the herbicide to be used for an individual patch, and this record was used in subsequent analysis, including the selection of a patch, the purchase of herbicide, and deployment of Applicators. Because this herbicide prescription was a critical link in the entire program, the ACCC took measures to ensure Scouts completely understood the process through special training and regular conference calls to discuss scenarios.

Cogongrass Treatment

Enrolled properties that met all criteria, had been visited by a Scout, and had cogongrass documented and successfully imported into the GIS by the summer of 2011 were eligible for selection. As previously described, some properties were not selected for various reasons. A map showing the selected properties is provided in Figure 6. Figure 7 shows the county-level proportion of selected properties.

The treatment of cogongrass patches started shortly after the grant began in October 2009 and continued each spray season until July 20, 2012. The spray season was determined, in part, by weather conditions and scheduling with Applicator crews. Typically the cogongrass spray season occurred after green-up and before the first frost. These dates varied each year depending on the location. In the southern portion of Alabama the season occurred from March to November, while in central and north Alabama the spray season typically occurred between April and October.

Table 12 is a list of the number of patches (and their acreage) documented by Scouts for each herbicide treatment. Table 13 is a list of the *treated* patches (and acreage) documented by Applicators over the course of the grant. There was an increase in treated patches every year as more Applicators were added and newer GPS/GIS technologies implemented. Figure 8 and 9 show the number of patches and acres treated by county over the life of the grant. Applicators accounted for 38% of all hours reported during the life of the grant.

Though the Scout's herbicide prescription impacted the potential selection and treatment of a cogongrass patch, the Applicator was given the final authority to change a prescription if necessary. For example, if a prescription called for imazapyr treatment in a hardwood-dominated patch, the

trees may have been injured or killed by application of that herbicide. This may have been unintentional by the Scout who accidentally chose the incorrect herbicide. However, in some cases the landowner instructed the Scout that the cogongrass should be treated no matter the corollary damage to other plants. Unless the landowner signed an imazapyr waiver, which allowed the use of imazapyr in areas that might affect non-target species, Applicators were instructed to treat this type of area with glyphosate or aquatic glyphosate. By allowing the Applicator to change the herbicide used the ACCC ensured that injury to non-target plants was minimized. Fortunately, this situation was observed only 2 times throughout the 4 spray seasons.

In addition to the Applicator having control over herbicide application, several data filters in the GIS were used to flag questionable combinations of cover type, water proximity, and herbicide prescription. This was easily done by comparing several fields in the database, such as:

- Sites with close proximity (<50 feet) to water but herbicide not aquatic glyphosate
- Sites with cover type containing hardwoods but herbicide imazapyr
- Sites with cover type containing pines and tree height less than 5 feet
- Sites with cattle present

Where these situations occurred, the Scout was contacted to discuss the situation first. In the case of imazapyr treatments a waiver was sent to the landowner or property manager with instructions to sign. With sites containing cattle, an additional question on the enrollment form specifically stated the timeframe at which cattle should be kept off the site post-treatment and/or sent to the slaughterhouse if ingesting cogongrass treated by the ACCC. If not resolved the herbicide treatment was changed to the least harmful option by the ACCC or the Applicator.

2009 Spray Season – Because the program began in September 2009 there was not much time to conduct an expansive spray season for that year. As a result the ACCC implemented a short pilot season with only a few documented cogongrass patches sprayed. All treated patches were in Greene County, southwest of Tuscaloosa, AL. A total of 140 patches covering 13 acres were sprayed in October 2009. These were documented using a Garmin eTrex GPS unit and paper forms. In essence the ACCC chose to spray cogongrass in 2009 for 2 reasons. First, the ACCC wanted to begin creating jobs as soon as possible. One hundred and ninety-five hours were reported by 2 spray crews for the 2009 spray season. Second, the ACCC wished to implement a simple system for tracking Applicators. The paper forms were completed at every treated patch and entered over the winter in an Excel spreadsheet.

2010 Spray Season – In 2010 the ACCC expanded the spray season to include more counties around west-central AL where much of the documentation had occurred to that point in time. A total of 2,128 patches covering 149 acres in 7 counties were treated during the 2010 spray season. GPS data were recorded with the Garmin eTrex, and paper forms used to record additional information. The Applicators were instructed to record a waypoint, i.e., a single point, in the center of the patch if it was smaller than 0.1 ac. If larger than 0.1 ac, the Applicator recorded the sprayed

boundary, walking twice around the perimeter. By recording the perimeter twice the GIS staff was able to create a more accurate representation of the patch in the GIS. The 2010 spray season began on July 22, 2010 and ended October 28, 2010 (98 days).

2011 Spray Season – In 2011 the ACCC added more Applicators and assigned counties to the spray program. During the winter of 2011 the ACCC tested and implemented a GPS solution for the Applicators. Each Applicator was provided a Getac PS535f for documenting spatial and tabular data for every treated patch. In addition, the GIS database and application were improved to allow for remote data transmission by the Applicators. By doing so the Applicator could receive their assigned data over the internet without having to mail their GPS units to the Coordinator. More GIS staff was added to 1) increase the processing speed of the raw GPS data being sent by Applicators and 2) create printable maps for each property the Applicator could use for navigation and troubleshooting. With the latter, an FTP site was revamped to provide a source of these maps for the ACCC and its subcontractors.

In the 2011 spray season the ACCC determined that the best use of resources included assigning all of a county's selected patch data—and only one herbicide type—to an Applicator. Separate maps for each herbicide were created for each property. The intention was to minimize issues with mixing herbicides and make it perfectly clear which patches would receive a particular herbicide treatment. Also, the GPS data received by the Applicator included only the assigned patches to be sprayed with a single herbicide for that county. While this approach did lessen the probability of incorrect herbicide application, it presented other problems. The landowners expressed concern that the Applicator was missing whole portions of their property. For example, the landowner observed the Applicator spray 3 patches and then leave even though there were 18 other patches to spray. The Applicator only received the patches assigned a particular herbicide (in this example, 3 patches). The other patches would be treated using a different herbicide on the next visit. This created tremendous confusion between the landowner and the Applicator.

The intention was to begin spraying in early April 2011 and continue through late November. However, a severe and well-publicized drought affected the entire state in the winter and spring. Upon consultation with the Technical Committee the ACCC postponed the beginning of the 2011 spray season until weather conditions improved. In early July 2011 more suitable weather patterns resulted in frequent afternoon showers across the southwestern portion of the state. The ACCC made the decision to begin spraying in Baldwin County first as a result of the drought lessening in that region. The ACCC also planned to treat patches until the latest possible date. An early frost, however, forced the season to end approximately 6 weeks earlier than planned. The 2011 spray season began on July 16, 2011 and ended on November 4, 2011 (111 days). A total of 7,474 patches covering 503 acres in 21 counties were treated in the 2011 spray season. The majority were re-treatments from 2009 and 2010. Twenty-seven individual Applicators worked during the 2011 spray season. Because of the reduction in days for the spray season there were several counties not visited by the Applicators. The most important of these were in the southeast corner of the state, which

was designated by the Technical Committee as a high-priority area. This would have impacts on the next year's spray season.

2012 Spray Season – The 2012 spray season was the last year of treatments for the ACCC. In the winter of 2012 the official end date of the entire grant was May 31, 2012 per the contract between the AFC and Larson and McGowin. Because the grant's end would fall in the middle of the spray season the decision was made (with consultation by the Technical Committee) to begin that year's spray season in March, earlier than the previous seasons. This would give the greatest flexibility in treatment for 2012. Preparation for the spray season began in December 2011 with selected GIS data being exported to GPS units over the winter. Landowner maps were also created during the winter and spring 2012. In March 2012, the grant was extended to September 7, 2012 through the leadership and hard work of the AFC. With this new deadline the ACCC could wait to begin the spray season, allowing for adequate green-up of cogongrass statewide.

Because of the issues with single herbicide treatment crews in the 2011 spray season the ACCC packaged *all* selected patch data, i.e., all 3 herbicide treatments, for a county at one time. These were then loaded onto the Getac PS535f units. Because of hardware storage limitations with the GPS units, some counties with large numbers of selected patches were divided into multiple regions. When the Applicator finished a specific region the ACCC would assign the next region for that county.

The 2012 spray season began on April 12, 2012 and ended July 20, 2012 (99 days). A total of 6,403 patches covering 646 acres in 31 counties were treated in the 2012 spray season. As in 2011, many of these were re-treatments from previous seasons. Thirty-three individual Applicators worked during the spray season. Because the Applicators did not spray patches in the southeast corner of the state in 2011 the ACCC worked diligently to 1) have the Applicators start early in this region and 2) select more landowners for treatment. The latter was made easier because of the low enrollment in these counties, proper budgeting techniques, and minimizing other costs through technology.

The Coordinator constantly monitored the invoicing and disbursements for the grant to determine the speed at which funding was being expended. In early July 2012 it was determined the grant funding was going to be fully spent at the end of the month. Therefore the ACCC established a final treatment date of July 20, 2012 to enable invoice payments to be processed and disbursements to occur before the end of the grant. Because the end date was earlier than that originally anticipated (mid-August) there were several counties that were not visited in 2012. These included Choctaw, Greene, Monroe, and Perry County. Fortunately, almost all of the Greene County cogongrass patches had received multiple treatments (2010 and 2011). Choctaw, Monroe, and Perry County patches received treatments in 2011.

Treatment Efficacy

While the primary objective of the grant was the creation or saving of jobs, another important goal was to treat cogongrass and attempt to eradicate it on the sites that were chosen. The participants in

the program viewed cogongrass treatment as the highest priority though they did understand the importance of job creation. Since many thousand individual patches of cogongrass were treated the ACCC wished to examine the efficacy of these treatments. The effective control of cogongrass treated by the ACCC varied widely, depending on several factors such as 1) the amount, rate, and type of herbicide applied; 2) location and site quality; 3) time of year treated; 4) individual performance of the Applicator; 5) water hardness; and 6) weather conditions. Many other factors impacted the efficacy of treatments. Most of the aforementioned factors were documented at the time of treatment and should be examined in the future to give better precision to treatments.

As expected, the most control of cogongrass occurred in areas that received multiple herbicide treatments. Fortunately, a majority of the selected cogongrass patches and their acreage received multiple herbicide treatments (Table 14). This will have positive future impacts on cogongrass control in some regions of Alabama. A total of 7,995 individual sites covering 913 acres were treated at least 2 times during the grant (Table 14). The Applicator made the decision at the time of treatment if multiple cogongrass patches would be treated—and thus documented—as a single patch. Multiple patches were grouped as a single patch by the Applicator if there was overlap of herbicide between patches. If this occurred the Applicator recorded the information in their GPS unit for one patch and entered the additional patch identifiers in the Notes section. Fortunately, in the GIS application the treatment polygon was overlaid with the cogongrass patch. Any overlap was automatically noted through spatial analysis, updating the cogongrass patch treatment history in the process.

In August 2012 a random sample of sites that received at least 2 treatments during the life of the grant was generated. Four Scouts were deployed to examine the selected patches to determine the proportion and distribution of green leaf material remaining and the proportion of live rhizomes. A total of 212 patches were selected, covering many of the counties where treatments occurred. These included glyphosate (94 sites), imazapyr (112 sites), and aquatic glyphosate (6 sites) treatments.

Table 15 is a summary of the percentage control, i.e., level of eradication by each herbicide type. The highest level of control was with the imazapyr treatment, with 59% of all sampled sites showing no green material after at least two herbicide treatments (Table 15). Glyphosate and aquatic glyphosate treatments resulted in 41% and 33% of the sites fully controlled, respectively. Overall, 96% of the sampled patches demonstrated excellent cogongrass control, i.e., >80% control of green material.

For the sites where no green leaves were found, the rhizome population was examined by digging a hole in the center of the patch. Dead rhizomes were found in 59% of all sampled sites that had no green leaves visible (Table 16). A mix of live and dead rhizomes was observed in 40% of the sample population, and less than 1% had exclusively live rhizomes. Therefore, 99% of sites without live aboveground material had rhizomes that either totally dead or dying. The highest percentage of dead rhizomes was found on sites treated with glyphosate (77%), followed by aquatic glyphosate (50%) and imazapyr (49%) (Table 16). This result was surprising because there is ample evidence that imazapyr treatments are more effective at cogongrass control than glyphosate or aquatic glyphosate.

The differences could be soil-, site- or location-related, something that was not examined for this report. The differences in efficacy with respect to herbicide would be worthy of further study.

On treated sites with green cogongrass leaves remaining, the majority of the sites (60%) exhibited a clumped distribution of the live cogongrass. Patterns among the herbicide treatments were similar except for aquatic glyphosate treatments which exhibited a halo pattern in 50% of the samples (Table 17). However, there were only 4 aquatic glyphosate sites with any live grass, so this could simply be a result of the low sample.

The variation in live grass distribution among herbicide treatments indicates differences in application patterns. In areas treated with glyphosate, the majority of remaining live grass was clumped. This is due to several factors, the most likely being a result of Applicators using hand wands for these sites (*data not presented*). Imazapyr sites were applied with booms and tractors, hence the greater proportion of strips of green material (Table 17). The aquatic glyphosate treatments exhibited the largest halo effect around the perimeter of the treated area. The Applicators were especially careful in areas treated with aquatic glyphosate. This conservative approach likely resulted in the large proportion of "halo sites". A more likely reason is the small number of samples. More sampling should be done in these areas to look at long-term response of these multiple treatments. This would add to the knowledge base of effective herbicide treatments across multiple sites, time of application, equipment usage, etc.

Landowner Education and Outreach

Mr. Pecot was responsible for giving public presentations about the ACCC to a variety of organizations, including the Kiwanis Club, Rotary Club, Alabama Farmers Federation, Alabama Forest Owners Association, AFC Commissioners, Alabama Treasure Forest Association, Society of American Foresters (national and local meetings), Alabama Department of Conservation and Natural Resources, Natural Resources Conservation Service, Montgomery Gardener Association, Fairhope Environmental Advisory Board, and many private landowner groups. Mr. Pecot attended several national conferences, including: 2 Society of American Foresters conferences (2009, 2011), 2 Exotic Plant Pest Council (2010, 2011). He presented the work of the ACCC to several regional and state conferences, including the Alabama Vegetative Management Society meeting in 2010. In all Mr. Pecot gave 64 oral presentations on behalf of the ACCC between 2009 and 2012. Mr. Autrey gave 1 presentation in November 2012 at the Natural Areas Conference in Tallahassee, FL.

There was thorough and positive press coverage of the ACCC throughout the life of the grant. The ACCC received a jump start in September 2009 when it was featured in the *New York Times* (This Land, a series by Dan Barry)[2]. The ACCC was interviewed for several other newspapers and magazines (*Scientific American*, July 2011; *Montgomery Advertiser*, March 2010; *USA Today*, November 2009; and *Mobile Press-Register*, September 2009). Mr. Pecot contributed several articles to magazines

[2] http://www.nytimes.com/2009/09/21/us/21land.html?_r=1

with state and national coverage, including *Forest Landowner* (Nov/Dec 2011), *Alabama's Treasured Forests* (Summer 2011, Fall 2010, Fall 2009), *The Registered Forester* (December 2009). Finally, the ACCC was featured in a USFS General Technical Report as 1 of 8 case studies of socioeconomic impacts of funded stimulus projects[3].

V. Lessons Learned

Program Structure

Lesson #1: Having divided responsibilities within one organization allowed the program to flourish.

Though more challenging with limited funding, part of the ACCC's success can be attributed to the clearly designated responsibilities for each person contributing their work. Any overlap between jobs was designed to complement, and not detract from, the overall objectives. With respect to Scout and Applicator subcontractors, having a single point of contact for each of these helped minimize communication issues and maximize their work. For example, the Applicators were instructed to contact their supervisor first (the foreman for a group of Applicators) who would then contact the Spray Supervisor. If there were technical issues with the software the Applicators were instructed to contact a single person at Silvics Solutions (Mr. Garella) who worked through the issue with them.

Structuring the program so that 1) Larson and McGowin positioned itself as subordinate to the AFC and 2) the Technical Committee was the official arbitrator of technical and treatment issues helped mitigate issues and promote an environment of inclusion for several key parties. This also allowed Larson and McGowin to coordinate, organize, and execute the program as a primary contractor.

Lesson #2: Short enrollment forms worked to the program's advantage.

Larson and McGowin decided early in the program that minimizing the amount of forms the participant would have to complete would serve 2 purposes. First, it would help the enrollment process to be as fast as possible. Second, people that may have been otherwise hesitant to participate in a government program would be impressed by the lack of "red tape" in dealing with the ACCC. Though the enrollment form went through several iterations, the goal was to keep the form at no more than 2 pages while revealing adequate information about the property to make an informed decision regarding selection and treatment of the cogongrass.

Lesson #3: Legal review of forms minimized issues in the long run.

Larson and McGowin met with their company's attorney on several occasions to ensure all agreements and forms were appropriate for the program and protected the parties working for the

[3] http://www.treesearch.fs.fed.us/pubs/37857

ACCC. This due diligence prior to implementation paid off in the future through fewer issues between the program participants, the subcontractors, and Larson and McGowin.

Lesson #4: The landowner enrollment process could be made more efficient.

Landowner enrollment in the ACCC was fully open from mid-September 2009 until August 2012. The reason for an open enrollment was to maximize job creation and gather more information about cogongrass. Thus, every property that was enrolled up to the very end of the program (July 2012) was visited and the cogongrass documented where found. This maximized the database of known cogongrass patches but created unintended problems with respect to communicating about which properties were selected and which were not.

For future projects where job creation is not the primary objective it is suggested to have limited open enrollment periods lasting a few weeks or months. In the ACCC this approach would have helped reduce lag time between enrollment and treatment. As an example, opening enrollment every 6 months for a 30-day period would build a list of properties to visit when the enrollment period was over. This would give 5 months to document cogongrass and move the data through the GIS prior to the next enrollment period. This potentially could have helped focus documentation and treatment efforts closer to the time of enrollment. This would also allow for ongoing financial analysis as to when enrollment should be closed altogether.

A second approach would have been to totally close enrollment after a certain time, and not allow any other persons into the program. If enrollment had been closed in December 2010, there would have been several months to select landowners for Strategy #6 and to prepare the treatment data for the Applicators.

These 2 approaches may work for other programs in the future. Insofar as the ARRA grant is concerned, these 2 approaches would likely have resulted in fewer jobs created or saved. Because enrollment stayed open, many new participants were under the impression that they would be selected for treatment, even after the ACCC had communicated with them that all the sites to be treated had been selected. The database that was created over the course of the grant will be helpful for future programs as over 26,000 locations are documented and ready for treatment.

Lesson #5: Herbicide prescriptions are vital for maximizing efficiency and minimizing cost.

The Technical Committee spent a good deal of time working through the herbicide prescriptions. This work was well worth the time and effort expended. The product of this work, a dichotomous key for herbicide prescriptions in cogongrass, was shared with all program participants at the end of the program.

Limiting the number of herbicides and application rates used greatly simplified field work by Scouts and Applicators. The mixing of two herbicides at varying rates depending on site would have added a great deal of "sophistication" to the treatment which could have intimidated some landowners into

not treating at all. Having a simple decision process helped landowners better understand how the ACCC was approaching cogongrass treatment. Landowners were also more receptive to the idea of treating cogongrass on their own with the information the ACCC provided to them.

Data Collection

Lesson # 1: The use of an integrated data collection system is paramount for future success.

Prior to 2009 little financial resources were allocated to cogongrass across the southeastern United States. Because the ACCC was a large statewide effort, it was absolutely critical there be a single database to manage all of the data. Without this approach it would have been nearly impossible to track an individual cogongrass patch or landowner participant through the 3 years of the grant. Larson and McGowin established a network that enabled field users to transmit Scout data to a single point and have that data processed in a timely manner. Without several components working in concert, including the GPS application, the data transfer system, and the GIS the program would not have been as successful.

The cost of implementing this type of system was primarily contingent on the number of field users. The basic setup for this program was a GPS unit (including software to collect and transmit the data), a computer server running Microsoft Server 2008, Microsoft SQL Server, a GIS application (IFMS, licensed by Silvics Solutions), and software to transmit data between central and field servers. This core setup could be easily expanded by adding more GPS units. The GPS models used for the ACCC were running Microsoft Windows CE or Mobile. In the future, other operating systems could be used as long as data could be imported into the GIS. In other words, Android or iOS devices could be implemented as long as the data exported was in XML or some other easily translated language or data format.

Training and support protocol for end users is extremely important for field data collection to be efficient. It must be easier for the person in the field to utilize the data recorder than to resort to paper forms as is the tendency with some field personnel. In most cases the Scouts and Applicators learned the proper use of the GPS units quickly, and technical support by Silvics Solutions was helpful if questions arose. Some Scouts and Applicators had never used a computer, so their learning curve was steeper than others. Keeping an open line of communication between these users, technical support, and the Coordinator helped to minimize issues.

Lesson #2: The suite of data collected was effective but could be refined in the future to maximize efficiency.

The decision to collect the amount of field data was made to provide the greatest slice of information while being cognizant of the cost associated with data collection. Therefore, the actual form that the field user interacted with on the GPS unit was streamlined to minimize time spent at each location. The Scout had 32 fields of information to confirm before saving a record. Fortunately, most of this information was set to repeat at the next record. This allowed the Scout to enter in basic information about the landowner (name, address, phone number) and property

(county, directions) and have the next record inherit the information automatically. Patch information could also be repeated, saving time spent on form completion in locales where information was the same except for the exact GPS location and the patch name.

The Applicators had 50 fields to approve for each treated patch. The majority of this was automatically filled in from the GIS, and the Applicator needed only complete information specific to the treatment. Like that of the Scout form, having repeat functionality maximized the efficiency of data collection.

With both forms (Scout and Applicator), the flow progressed from specific data (individual patch) to the most general (landowner). This allowed repetitive data to be housed on other tabs in the application, out of the way of the user. The user accessed these tabs when data changed, e.g., a new property or changes in weather condition.

As noted in the previous lesson, minimizing the time spent entering data helped maximize efficiency and lessen the desire to use paper forms. All subcontractors expressed satisfaction at using the GPS units for data collection. Though technology will certainly change through time, it is suggested that future work in this vein use forms that maximize data collection and minimize user input through automatic features where possible.

Hardware and Software

Lesson #1: The use of a GIS should be paramount in any invasive species program in the future.

Because of the type and breadth of data that is necessary to collect for invasive species programs, having the ability to record spatial and tabular data is vital for success. A GIS is currently the best way to manage these types of data. Having the field and office software and hardware communicate with each other is crucial for future work.

Lesson #2: The field hardware was suitable for the overall task, but other hardware should be examined moving forward.

The GPS units utilized for this program, i.e., Trimble Juno SB and Getac PS535f, were overall well suited for the program. The Juno units lasted the longest and exhibited the least problems over the duration of the grant. Only 3 Junos had to be sent back to the dealer for service. The operating system (Windows Mobile CE) had been in existence for a long time and was very stable. The application used for data collection crashed less on the Junos.

In contrast, the Getac PS535f units were problematic from the time they were first received. Several units had to be sent back to the factory before even being deployed to the field. The Getac units were specifically purchased because of their durability, having a waterproof/shockproof/dustproof rating much higher than that of the Junos. The Getacs needed repair more than the Junos. Moreover, the Getacs were only used for a little over a year, and nearly 20% had to be replaced or

repaired. This may have been a result of the much harsher use by the Applicators, but many of these exhibited problems before they were deployed. In hindsight the ACCC should have purchased more Junos and storage cases for the Applicator's use. The Junos were also less expensive then the Getacs ($1200 vs. $1500, with software) and held up better with use (3 years vs. 1 year).

Lesson #3: Software should be tested in full prior to implementation.

The initial versions of the GPS application used by the Scouts were a stable lot. Future versions were sent as part of new purchases or repairs by Tri-Global Technologies without the ACCC's knowledge or consent. This created problems as new versions were not fully tested prior to deployment. In addition, the GPS units were in the field user's possession. This made system-wide fixes very difficult as some users were not experienced enough to perform simple upgrade or downgrade tasks.

For future work it is suggested to find a version that is stable and stay with that version for the duration of a program. Having a single version of software on multiple field units makes troubleshooting and replacement far easier.

Documentation and Treatment

Lesson #1: Having a dedicated Scout force positively impacted the amount of cogongrass documented.

Similar to the delegation of duties of Larson and McGowin employees working for the ACCC, the separation of duties with field subcontractors maximized efficiency. Scouts had the main responsibility of finding all the cogongrass on a property and recording the necessary information. They were also the primary point of contact between the landowner and the ACCC, sometimes having gate keys and combinations for the duration of the program. Larson and McGowin chose Scouts that were effective communicators, experienced in forestry and land management, and could be ambassadors of the ACCC. Not all Scouts were Registered Foresters, and those that weren't received special attention and training at the beginning of their contract to ensure adequate comprehension of program objectives.

Lesson #2: Internal controls to prevent conflicts of interest are necessary to prevent abuse of the system.

Because Larson and McGowin made an attempt to deploy Scouts and Applicators in their local areas, there was concern of conflicts of interest. Specifically, Larson and McGowin wanted to minimize Scouts and Applicators working on properties where they had any financial stake. For example, some Scouts enrolled properties they actively managed. To minimize this conflict the ACCC required subcontractors to disclose this information to Larson and McGowin. Any Applicators that had a stake (financial or otherwise) in a property did not treat that property as part of the grant. Scouts could document cogongrass on a property but were not part of the selection process. In fact, the landowner selection process did not include any information about connections between the ACCC and the participant.

Other tasks and approaches performed during the life of the grant were formalized as standard operating procedure (SOP) documents and distributed to the subcontractors. These SOPs included data collection, communication with landowners, interactions with the press, landowner selection, herbicide application, and many other examples.

Lesson #3: Deploying a small team that focuses on one property at a time may work well in some areas but not others.

Larson and McGowin held a debriefing conference call with the AFC and subcontractors at the end of the grant. The most significant complaint the subcontractors presented was the lag time between the date of landowner enrollment and the time of treatment. In some cases, this was as much as 2 years. In normal situations, i.e., not the ARRA grant, a landowner contacts a private subcontractor who visits the property and begins treatment soon after. With the ARRA grant, Larson and McGowin was conceptualizing, testing, and implementing a statewide, long-term invasive species program simultaneously. Also, the primary objective of job creation tempered much of the ACCC's operating procedures. Finally, landowner selection was dependent upon examining an entire county's sample data, so one property's probability of selection was based on its relation to the other properties in that county. Thus, there were some aspects to the ACCC that were different than what might be observed in the normal course of business.

Future projects that are broad in scope like the ACCC would benefit from minimizing the time between enrollment and treatment. This can be done in several ways. One approach is to separate the project into separate treatment seasons, and treat each year as its own project. But likely the most efficient approach is to have a single team working on one property. The team would be made of a Scout (that is also the Inspector) who documents the cogongrass. The GIS data, as soon as it is imported, is examined and a decision made about selection. The Applicator quickly gets the data if selected and treats the cogongrass. The Scout then serves as the Inspector, monitoring the Applicator as they traverse the property.

In another scenario, one would not have any Scouts but only Applicators and Inspectors. Put another way, the Scout is also the Applicator. With this approach the Applicator collects the data and submits to the project coordinator. If the property is selected the project coordinator informs the Applicator and the Inspector. The Applicator treats the cogongrass, and the Inspector randomly checks the treatments.

These 2 scenarios would not have worked with the ARRA grant because it was critical to create as many jobs while documenting as much cogongrass as possible. Also, to have a fair system that maximized impacts of treatment there needed to be enough data to make an *objective* selection. If the ACCC had simply begun in one area and treated until that area was complete there would have been entire areas of the state ignored. Given the parameters of the program's structure a similar project in the future would be best served to have a specific enrollment, selection, and treatment period. With the amount of cogongrass data that was collected through the ACCC, future work could utilize these data and perform treatments only.

Lesson #4: An herbicide tracking system is a necessity to control inventory and minimize misuse of product.

Given the amount of herbicide that was being utilized for the program the ACCC needed an auditable solution to track the possession and use of herbicide. At the strong urging of the Technical Committee, the ACCC implemented a system similar to that used by ALDOT and the Mississippi Forestry Commission. This tracking system, called Aqumix, was a barcode-scanning system that allowed for monitoring of individual units of herbicide being used by the Applicators. The Survey Supervisor worked with the herbicide supplier to oversee this effort. Herbicide was shipped to 2 AFC field offices (Semmes and Northport, AL), and AFC employees at those offices were trained in the online tracking system. When an Applicator picked up and returned herbicide containers the AFC employee entered this information into the system. The ACCC was able to monitor which herbicide drums were being or had been used. The ACCC required all Applicators to return empty drums in a timely manner or risk being charged for the price of a full, unused drum. This simple requirement resulted in only one instance of an Applicator charged, and that drum was stolen from the person's truck.

The use of the Aqumix system or one similar to it is strongly urged for future work of this type. There would have been no reliable, financial feasible way to monitor the volume of herbicide that was being used for a program of this scale without it.

Lesson #5: Comparing herbicide usage with GPS data is useful as an augment for inventory control.

Related to the use of the herbicide tracking system is the comparison of recorded application rates with what is being applied on the ground. The Applicators were required to record the amount of solution were applied to an individual patch. By comparing this information with the acres as reported by the GIS, the ACCC was able to monitor gallons per acre rates of application. This served to improve the performance of several Applicators by clearly demonstrating they were applying far too much—or too little—herbicide relative to other crews.

In addition to monitoring applied rates to an individual crew, future work that has an Inspection component can examine efficacy of individual Applicators or companies. This can help pinpoint issues that can be resolved with additional training or using different Applicators.

Lesson #6: A production-based compensation structure may be better for some invasive species programs.

The nature of invasive plant treatments lends itself to an hourly fee structure for an Applicator. For future projects where job creation is not the primary objective, significant consideration should be given to a production-based compensation structure. Care should be taken here so as to prevent reductions in treatment quality. One option would be a fixed compensation amount for a given property that is only paid after the property has been completed and inspected for thoroughness. This would put the burden on the Applicator to use the most efficient means available to complete treatments on the property. This would add a great deal of time on the part of the Inspectors but could be worth it financially.

Invoicing and Payments

Lesson #1: Having an accounting system significantly increased the speed of processing.

Any program that involves subcontract labor will be measured by the speed at which invoices are reimbursed. While the Larson and McGowin invoicing was streamlined and efficient, further work should be applied at the state and federal level to ensure timely payments. A subcontractor will only work for a delayed payment if no other work is available. In better economic times, this program may not have been as successful due to this key point.

Landowner Feedback

The ACCC did not send out a formal questionnaire to program participants upon completion of herbicide treatments. As such a formal approval rate of the program is not known. However, the ACCC kept an open line of communication with the participants and strongly urged them to provide feedback. There were only 5 properties—out of 1,145—whose landowners or property managers expressed dissatisfaction. Based on that statistic the approval rate was 99.56%.

Of these 5 properties, only 2 had documented damage to non-target plants. In one of these cases the damage was to an adjacent landowner's hardwood, which was handled by the Applicator's liability insurance policy. In the other instance some young longleaf pine saplings had been damaged by Applicator equipment, not by herbicide. The Applicator replanted, at his expense, new longleaf pine seedlings to the satisfaction of the landowner. Of the 3 remaining properties, these landowners expressed the opinion that some cogongrass had been missed by the Scout and, subsequently, not included for the Applicator to treat. In those cases the ACCC deployed a Scout to document the remaining cogongrass. The data were imported into the GIS and the data sent to the Applicator for treatment. These 3 landowners were pleased at the quick resolution.

For each negative feedback received there was many times that in positive feedback. The ACCC received numerous letters from landowners who expressed thanks for documenting and treating the cogongrass on their property. In some cases the landowners were elderly who never would have been able to treat the cogongrass themselves. Or they did not have the financial resources to pay someone to do it.

Every landowner that participated in the ACCC received a packet of information at the end of the program. This packet contained a thank-you note from the ACCC, a publication about the program, the herbicide decision tree, a list of Scouts and Applicators who worked as subcontractors, and a map of their property with all documented locations clearly marked. The locations on the map were color-coded by overstory cover type, which the landowner could use with the herbicide decision tree to pinpoint future treatments. Also, the map could easily be provided to an independent pesticide applicator to lower their out-of-pocket treatment costs.

VI. Conclusions

The Alabama Cogongrass Control Center was created to address long-standing problems with addressing the highly invasive plant cogongrass. In many respects this program was a success due to the diligent and hard work of the independent subcontractors that documented and treated patches of cogongrass on enrolled properties. The number of jobs created far exceeded the original estimate in the grant proposal. This was primarily due to the hiring of well-qualified subcontractors, the implementation of a GPS and GIS solution that greatly increased work efficiency, and the utilization of an accounting and invoicing system that streamlined subcontractor payments.

Larson & McGowin oversaw nearly 100 subcontractors that gathered or managed cogongrass data across the state. The data collected will add to the knowledge base of how best to fight cogongrass through targeted strategies and an efficient data management approach that can be implemented at any level of funding. It is strongly suggested that this type of system be used in the future for all invasive species programs across the country.

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VIII. Tables

Table 1. List of fields for the ownership layer in the GIS, used for data management of the Alabama Cogongrass Control Center.

Field	**Description**	**Generated By**
TractKey	9-digit number denoting a single tract (*Primary Key*)	GIS
OrgName	Text name of the database (Cogongrass)	GIS
StateName	State Name	GIS
CountyName	County Name	GIS
TractName	Name of Tract (based on Property Owner)	GIS
TractAcres	Acres of Tract (GIS-calculated)	GIS
PhysioCodeDescription	Physiographic region of the state	GIS
OwnerDesc	Name of Property Owner or Manager	GIS
OwnerTypesCodeDescription	Not Used	GIS
AcquisitionDate	Not Used	GIS
ExpirationDate	Not Used	GIS
TaxID	GIS-generated code	GIS
OrgKeyID	Database ID	GIS

Table 2. List of fields for the documented cogongrass layer in the GIS, used for data management of the Alabama Cogongrass Control Center.

Field	Description	Generated By
StandKey	9-digit number of the individual cogongrass patch (*Primary Key*)	GIS
State	State in which record is found	GIS
County	County in which record is found	GIS
TractName	Tract in which record is found	GIS
StandNumber	GIS-generated stand number within a tract	GIS
StandClass	Not used	N/A
SpotName	Name of cogongrass patch	Entered by Scout
LandOwnerAgrees	Landowner agrees to participate in program	Entered by Scout
GISAcres	Acres	GIS
EstimatedAcres	Estimated acres	Entered by Scout
TreatWith	Herbicide treatment	Entered by Scout
LandOwnerName	Landowner name	Entered by Scout
LOPhone	Landowner primary phone number	Entered by Scout
InfestationNotes	Scout notes about individual cogongrass patch	Entered by Scout
AddressLine1	Landowner or property manager address	Entered by Scout
AddressLine2	Landowner or property manager address	Entered by Scout
AddressLine3	Landowner or property manager address	Entered by Scout
City	Landowner or property manager city	Entered by Scout
LastTreatedBy	Has the cogongrass been treated prior to enrollment	Entered by Scout
LastTreatedOn	Date of last treatment, if applicable	Entered by Scout
TreatedWith	Method of last treatment, if applicable	Entered by Scout
TreatmentCount	Number of treatments prior to enrollment	Entered by Scout
TouchesWater	Within 50 feet of water or danger of runoff	Entered by Scout
LandOwnerTreated	Has landowner treated the cogongrass patch	Entered by Scout
EvidenceOf	Evidence of fire, mowing, road work, harvesting, etc.	Entered by Scout
Status	New or existing record (always new)	GPS
IdentifiedBy	Scout name	GIS
ScoutInitials	Scout initials	Entered by Scout
DateIdentified	Date cogongrass was documented	GPS
CrownCover	Level of overstory canopy cover (0-100%)	Entered by Scout
Species	Species of overstory (loblolly, hardwood, field, etc.)	Entered by Scout
TreeHeightCheck	Pine trees less than 5 feet height (yes or no)	Entered by Scout
Access	Access to individual patch (locked gate, unlocked gate, unrestricted, etc.)	Entered by Scout
Cautionary	Conditions to be aware of (gardens, people, agriculture, animals, etc.)	Entered by Scout
StandNotes	Notes about the *area* in which the cogongrass was documented	Entered by Scout
VendorRoute	Is there a GPS coordinate for an access point (yes/no)	Entered by Scout
LandOwnerNotes	Notes about the *landowner* (has key, wants call prior to visit, etc.)	Entered by Scout
XMLVersion	Version of form used by the GPS	GPS
LastUpdate	Date and time last updated in the GIS	GIS
OrgKeyId	Database ID	GIS
TreatmentSpotName	If selected for treatment, patch code (xxxxx-x-xxx)	GIS
ContractorDesc	If selected for treatment, Applicator company assigned	GIS
Program	Strategy assigned (1-6)	GIS
SelectedForTreatment	Is record selected for treatment (yes/no)	GIS
ExportedToVendorDate	If selected for treatment, date and time exported to Applicator GPS	GIS

Table 3. List of fields for the treated cogongrass layer in the GIS, used for data management of the Alabama Cogongrass Control Center.

Field	Description	Generated By
DSLKey	9-digit number of the individual treated patch (*Primary Key*)	GIS
County	County in which record is found	GIS
Land Owner	Landowner associated with record	GIS
Tract	Tract name associated with record	GIS
DSLName	Patch code (same as TreatmentSpotName)	GIS
TreatmentId	GUID denoting individual patch code	GPS
SpotName	Same as DSLName	GIS
EstimatedAcres	Estimated acres entered by Scout	GIS
TreatmentType	Herbicide prescription entered by Scout	Entered by Applicator
TreatmentMethod	Method of herbicide application (boom, hand wand, etc.)	Entered by Applicator
SolutionApplied	Amount of herbicide mixture applied (gallons)	Entered by Applicator
TreatmentDate	Date and time of treatment	GPS
WindSpeed	Wind speed at time of treatment (MPH)	Entered by Applicator
WindDirection	Wind direction at time of treatment	Entered by Applicator
Moisture	Soil moisture at time of treatment (heavy, light, etc.)	Entered by Applicator
Humidity	Relative humidity at time of treatment (0-100%)	Entered by Applicator
Temp	Air temperature at time of treatment (Fahrenheit)	Entered by Applicator
CloudCover	Cloud cover at time of treatment (0-100%)	Entered by Applicator
DrumTrackingNumber	Aqumix drum number	Entered by Applicator
BatchSize	Size of herbicide batch (gallons)	Entered by Applicator
ProductBatch	Amount of herbicide in batch (gallons)	Entered by Applicator
WaterHardness	Calcium and magnesium level in water (> or < 300 ppm)	Entered by Applicator
AddProdBatch	Additional product added to batch (surfactant, etc.)	Entered by Applicator
BatchDate	Date and time batch mixed	Entered by Applicator
GrassHeight	Height of green cogongrass at center of patch (feet)	Entered by Applicator
RhizomeDepth	Depth of live rhizome mat at center of patch (inches)	Entered by Applicator
SoilType	Texture of soil (loam, clay, sand, organic, rock, sand)	Entered by Applicator
SoilMoisture	Soil moisture (dry, damp, wet)	Entered by Applicator
H2OEdge	Patch is within 50 feet of water edge	Entered by Applicator
LandownerTreated	Not used	N/A
HistoryId	From Scout data (EvidenceOf)	GIS
InfestationNotes	From Scout data (InfestationNotes)	GIS
CoverType	From Scout data (Species)	GIS
CrownCover	From Scout data (CrownCover)	GIS
CoverSpecies	From Scout data (Species)	GIS
TreeHtCheck	From Scout data (TreeHtCheck)	GIS
AccessID	From Scout data (Access)	GIS
CautionID	From Scout data (Cautionary)	GIS
StandNotes	From Scout data (StandNotes)	GIS
LandownerAgrees	From Scout data (LandownerAgrees)	GIS
LandownerNotes	From Scout data (LandownerNotes)	GIS
LandOwnerId	From GIS (OwnerID)	GIS
CrewID	Not Used	N/A
XMLVersion	Version of form used by the GPS	GPS
StandKey	Stand ID (StandKey in GIS)	GIS
Latitude	Generated by GPS application	GPS
Longitude	Generated by GPS application	GPS
ShapeID	Not Used	N/A
MobileUnitId	Generated by GPS application	GPS
LastUpdate	Date and time last updated by GIS	GIS
OrgKeyId	Database ID	GIS
SeamKey	Type of GIS database record (herbicide application)	GIS
ActiveFlag	Active record in database (T/F)	GIS
GISAcres	Acres of individual record	GIS

Table 4. Summary of information about each strategy for the Alabama Cogongrass Control Center.

Strategy	Location	Number of enrolled properties (% of total)	Documented cogongrass (# of patches)	Documented cogongrass (ac)	Percentage cogongrass patches selected	Max acres of cogongrass treated per property	Treated cogongrass (# of patches)[4]	Treated cogongrass (ac)[5]
1	North of Hwy 80	261 (22.8%)	6,421	225	90%	25	8,910	424
2	State borders south of Hwy 80	41 (3.6%)	634	123	72%	10	635	103
3	Pinpointed counties in central AL	-	-	-	0%	10	-	-
4	Within 5 miles south of Hwy 80	36 (3.1%)	2,060	50	95%	10	1,820	53
5	Statewide	-	-	-	0%	10	-	-
6	South of Hwy 80	807 (70.5%)	17,147	1,738	51%	10	13,105	730
Total		**1,145**	**26,831**	**2,136**			**24,470**	**1,310**

[4] Includes re-treatments of individual patches and estimates of multiple patches treated as one patch by Applicator.
[5] *Ibid.*

Table 5. Landowner composite score tabulation for the Alabama Cogongrass Control Center. These factors were used to determine a property score for selection in Strategy 6 (Landowner Select). The maximum possible score was 87.

Module	Source	Possible points	Variable	Points
S-80 Counties	Enrollment	9	Region 1	9
Single choice			Region 2	7
			Region 3	5
			Region 4	3
			Region 5	1
AFC spots, county	GIS	4	0 spots	4
Single choice			1-25 spots	3.5
			25-50 spots	3
			50-100 spots	2.5
			100-250 spots	2
			250-500 spots	1.5
			500-1000 spots	1
			1000+ spots	0.5
Property size	Enrollment	8	<10 ac	8
Single choice			10-25 ac	7.5
			25-50 ac	7
			50-100 ac	6.5
			100-250 ac	6
			250-500 ac	5.5
			500-750 ac	5
			>750 ac	4.5
			Unknown	4
Total cogongrass scouted	Scout	17	<0.1 ac	17
Single choice			0.1-0.25 ac	16
			0.25-0.5	15
			0.5-1 ac	14
			1-2 ac	13
			2-3 ac	12
			3-5 ac	11
			5-7 ac	10
			7-10 ac	9
			>10 ac	8
			Unknown	0
Active cogongrass program	Enrollment	9	Yes	9
Single choice			No	0
			Used to	5
Duration of active program	Enrollment	12	5+	12
Single choice			3-4	10
			1-2	8
			Unknown	0
Border, part 1	Enrollment	8	Totally on property	8
Single choice			Borders private landowner and both enrolled	6
			Borders private landowner and one enrolled	3
			Borders public landowner	3
			Unknown	1
Border, part 2	Enrollment	6	Shares with road	2.5
Multiple choice			Shares with phone/power ROW	1.75
			Shares with ROW	1
			Unknown	0.75
Cogongrass location	Enrollment	12	Residential	2.4
Multiple choice			Agricultural	2.16
			Pasture	1.92
			Pine >20 ft	1.68
			Pine <20 ft	1.2
			Fallow field	0.96
			Hardwood	0.84
			Water	0.84
Scout prescriptions	Scout	2	Imazapyr	1.00
Multiple choice			Glyphosate	0.60
			Aquatic glyphosate	0.40

Table 6. Sum of all hours reported worked by month, July 2009 to September 2012.

Month	Hours Reported	Quarterly FTEs	Cumulative FTEs
Jul-09	-		
Aug-09	-		
Sep-09	382.44	0.74	0.74
Oct-09	807.44		
Nov-09	426.44		
Dec-09	467.44	3.27	4.01
Jan-10	336.44		
Feb-10	445.69		
Mar-10	608.94	2.68	6.68
Apr-10	689.55		
May-10	684.50		
Jun-10	459.65	3.53	10.21
Jul-10	1,467.95		
Aug-10	1,834.05		
Sep-10	3,205.40	12.51	22.72
Oct-10	3,247.60		
Nov-10	1,656.30		
Dec-10	1,638.80	12.58	35.30
Jan-11	1,758.90		
Feb-11	1,645.70		
Mar-11	2,306.80	10.98	46.29
Apr-11	2,553.05		
May-11	2,504.75		
Jun-11	2,254.95	14.06	60.35
Jul-11	4,310.05		
Aug-11	6,162.55		
Sep-11	6,330.90	32.31	92.67
Oct-11	5,629.15		
Nov-11	1,132.80		
Dec-11	918.80	14.77	107.44
Jan-12	1,349.35		
Feb-12	1,304.50		
Mar-12	1,543.10	8.07	115.51
Apr-12	3,339.00		
May-12	7,370.55		
Jun-12	7,106.15	34.26	149.77
Jul-12	6,511.00		
Aug-12	484.05		
Sep-12	-	13.45	163.22
Cumulative Hours	**84,874.70**	**163.22**	

Table 7. Monthly hours worked for each person or group for the ARRA project, July 2009 to December 2010. C1=Coordinator (includes all staff), GC*x*=GIS subcontractor, SC*x*=Scout subcontractor.

Contractor	07/09	08/09	09/09	10/09	11/09	12/09	01/10	02/10	03/10	04/10	05/10	06/10	07/10	08/10	09/10	10/10	11/10	12/10
C1			326.44	326.44	326.44	326.44	326.44	326.44	326.44	430.55	316.00	255.65	506.95	341.55	300.65	198.10	185.55	163.55
GC1				18.00	69.00	6.00	9.00	3.00	21.00	37.25	33.00	12.00	3.00	9.00	13.00	25.00	17.00	22.00
GC2								25.00	-	56.25	23.25	17.00	33.50	68.50	72.25	48.00	66.75	6.50
GC3												1.25	-	11.25	21.00	10.50	44.50	44.25
GC4												7.00	2.25	2.00	8.75	0.75	1.00	-
GC5							1.00	51.25	-	-	-	4.75	12.00	20.00	5.00	13.50	11.00	14.75
GC6																7.00	11.50	-
GC7													10.75	10.00	-	-	6.00	8.50
GC8																		2.00
GC9																		
GC10																		
SC01			56.00	168.00	31.00	135.00	-	40.00	261.50	165.50	180.00	137.00	176.00	309.00	252.50	175.50	89.50	122.50
SC02											36.00	25.00	-	76.00	187.00	4.00	25.00	11.00
SC03											51.00	-	10.00	19.00	17.50	1.00	3.00	-
SC04											45.25	-	23.00	12.00	36.75	1.00	4.00	2.00
SC05													127.00	107.00	35.75	40.50	81.00	37.50
SC06															134.00	91.00	73.00	77.00
SC07															37.75	116.00	130.00	90.50
SC08															88.00	145.00	109.00	151.00
SC09															93.00	147.00	124.00	162.00
SC10															26.50	132.00	85.00	141.00
SC11															114.50	144.00	105.00	-
SC12															78.00	118.00	30.00	26.75
SC13															190.00	18.00	38.00	14.50
SC14															186.00	231.00	126.00	105.00
SC15															35.00	7.00	3.00	-
SC16															142.00	42.50	2.50	-
SC17															44.00	205.75	69.50	96.00
SC18																20.00	133.25	191.50
SC19																	78.25	149.00
SC20																		
SC21																		
SC22																		
SC23																		
SC24																		
SC25																		
SC26																		
SC27																		
SC28																		
SC29																		
SC30																		
SC31																		

Table 7 continued. Monthly hours worked for each person or group for the ARRA project, January 2011 to September 2012. C1=Coordinator (includes all staff), GC*x*=GIS subcontractor, SC*x*=Scout subcontractor.

Contractor	01/11	02/11	03/11	04/11	05/11	06/11	07/11	08/11	09/11	10/11	11/11	12/11	01/12	02/12	03/12	04/12	05/12	06/12	07/12	08/12	09/12	2009-2012
C1	291.40	235.70	237.30	286.40	256.70	247.95	336.30	290.80	279.40	264.70	172.30	179.55	256.60	228.50	233.60	189.55	282.80	232.90	168.50	180.80		9,835.35
GC1	41.00	50.50	8.00	12.00	4.00	7.00	1.00	-	-	-	-	-	3.00	1.00	-	-	-	-	-	23.50		448.25
GC2	8.50	-	-	12.75	10.25	2.50	55.50	4.50	16.75	9.50	-	-	22.00	3.00	1.25	8.75	4.25	-	-			576.50
GC3	33.00	37.25	57.75	52.25	60.25	28.00	38.50	28.75	67.75	37.00	5.50	1.00	31.00	28.75	20.25	18.25	48.75	28.75	25.50			781.00
GC4	1.00	-	-	0.50	-	-									4.00	-	-	-	-			27.25
GC5	6.75	3.50	24.50	19.00	6.00	1.25	6.00	-	-	-	0.50	4.00	6.00		25.00	7.00	5.50	9.50	8.50			266.25
GC6	0.50	0.50	-	4.50	2.50	0.50	-	-	-	0.50	-	0.50	0.50	0.50	0.50	0.50	-	3.50	0.50			34.00
GC7	1.50	-	3.00	6.50	-	-	-	-	-	-	-	-	-		-	-	-	-	-			46.25
GC8	0.50	0.50	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-				3.00
GC9				36.75	67.25	94.25	100.50	83.75	85.75	55.75	42.75	30.00	16.00	12.00	8.00	11.50	43.25	29.00	-			716.50
GC10									99.25	10.25	-	-	-	52.00	137.50	5.00	38.25	10.00	-			352.25
SC01	-	182.00	193.00	166.50	199.50	118.50	216.50	252.00	135.50	132.50	96.00	66.00	50.00	114.00	141.00	185.50	165.00	224.50	190.50	45.50		5,173.00
SC02	82.50	50.50	104.50	74.50	105.50	47.50	71.50	51.00	42.50	-	68.50	-	-	84.00	68.50	78.00	90.00	119.00	104.00	2.00		1,608.00
SC03	14.00	22.00	23.00	31.00	59.45	13.25	22.25	8.00	4.00	-	-	-	30.00	24.00	27.50	28.00	25.00	-	42.00	2.00		476.95
SC04	2.50	8.00	15.00	20.75	25.25	16.25	16.25	23.00	5.75	-	-	-	-	-	-	-	8.00	-	32.50	2.00		299.25
SC05	57.75	55.25	110.25	124.50	89.60	91.25	137.25	28.50	62.75	30.50	-	-	-	21.50	63.00	56.70	99.00	75.25	-	2.00		1,533.80
SC06	50.00	64.00	52.00	50.00	79.00	91.00	77.00	120.00	133.00	72.00	13.00	20.00	29.00	10.00	31.00	10.00	106.00	100.00	210.00	93.00		1,785.00
SC07	144.00	20.00	4.00	13.00	2.00	-	7.00	2.00	3.00	1.00	-	-	-	-	-	2.00	38.00	2.00	-			612.25
SC08	117.50	112.50	172.50	159.40	136.50	43.00	147.00	91.00	110.00	119.00	62.00	134.00	110.00	110.00	-	92.00	130.00	143.00	70.00			2,552.40
SC09	134.00	155.00	170.00	145.00	160.00	180.00	144.00	185.00	167.00	149.00	151.00	154.00	164.00	158.00	-							2,742.00
SC10	126.00	19.00																				529.50
SC11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			363.50
SC12	32.00	2.50	38.50	25.00	51.00	120.50	145.50	139.00	62.00	68.50	14.00	9.00	26.00	-	23.00	43.00	80.00	91.50	-			1,223.75
SC13	19.00	11.00	11.00	20.50	50.50	135.50	166.00	130.50	79.50	67.00	6.00	59.50	43.50	18.00	30.00	40.00	103.00	50.00	40.00	2.00		1,343.00
SC14	106.00	58.50	153.00	190.50	177.50	155.50	107.00	125.00	98.00	93.00	69.00	-	-	-	35.00	128.00	106.00	125.50	87.00	19.50		2,482.00
SC15	-	-	-	15.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			60.00
SC16	-	-	10.00	103.75	186.75	204.75	181.25	217.00	204.00	187.75	51.00	-	-	-	101.50	183.00	186.75	181.50	140.00			2,326.00
SC17	20.50	88.50	177.00	126.75	22.50	24.50	-	121.25	207.50	56.00	-	-	-	-	-	93.00	121.00	90.00	167.50			1,731.25
SC18	161.75	164.00	193.75	142.25	170.50	180.00	163.00	185.75	157.75	165.00	100.00	88.75	163.00	135.50	167.00	164.25	178.00	176.25	110.00	68.25		3,379.50
SC19	183.25	171.00	182.25	178.50	180.50	85.50	144.00	192.25	149.50	135.00	24.00	-										1,853.00
SC20	124.00	134.00	174.00	203.00	194.50	188.00	174.50	212.00	224.50	140.50	110.00	57.00	179.00	175.50	190.50	189.50	212.50	208.50	153.50			3,245.00
SC21			3.50	16.00	72.00	131.00	131.50	153.50	54.50	8.00	-	42.50	60.50	25.00	55.00	-	13.00	67.00	29.00			862.00
SC22			8.00	65.00	50.25																	123.25
SC23			37.00	80.00	64.00	-	40.50	21.00	38.50	11.00	28.00	-	-	-	-	-	-	-	-			320.00
SC24							-	96.00	166.00	104.00	57.25	44.00	71.25	93.25	155.00	141.00	73.50	44.50	54.00			1,099.75
SC25			22.00	33.50	-	9.50	34.25	105.50	115.25	51.50	35.00	3.00	29.00	10.00	25.00	-	-	-	56.00			529.50
SC26			17.50	27.00	7.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-			51.50
SC27				40.00	14.00	29.00	35.00	25.00	13.00	5.00	-	-	-	-	-	22.00	38.00	38.00	6.00			265.00
SC28					-																	-
SC29							98.00	75.00	38.00	22.00	11.00	26.00	-	-	-	-	-	-	-			270.00
SC30						9.00	61.00	59.00	32.00	-	-	-	19.00	-	-	-	-	-	-			180.00
SC31								140.00	34.00	10.00	-	-	-	-	-	-	-	-	-			184.00

Table 8. Monthly hours worked for each person or group for the ARRA project, July 2009 to December 2010. AC1=Applicator subcontractor.

Contractor	07/09	08/09	09/09	10/09	11/09	12/09	01/10	02/10	03/10	04/10	05/10	06/10	07/10	08/10	09/10	10/10	11/10	12/10
AC01				165.00									100.35	138.75	161.25	130.50		
AC02																		
AC03													100.35	110.00	81.50	71.50		
AC04													100.35	110.00	140.50	98.00		
AC05													100.35	110.00	126.75	163.00		
AC06													100.35	110.00	158.00	85.00		
AC07														110.00	142.50	129.50		
AC08																163.00		
AC09																		
AC10																		
AC11																		
AC12																		
AC13																		
AC14																		
AC15																		
AC16																		
AC17																		
AC18																		
AC19																		
AC20													61.75	60.00	92.00	160.00	4.00	
AC21														50.00	92.00	140.00		
AC22														50.00	92.00	165.00		
AC23																		
AC24																		
AC25																		
AC26				130.00														
AC27																		
AC28																		
AC29																		
AC30																		
AC31																		
AC32																		
AC33																		
AC34																		
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AC41																		
AC42																		
AC43																		
AC44																		
AC45																		
AC46																		
AC47																		
AC48																		
AC49																		

Table 8 continued. Monthly hours worked for each person or group for the ARRA project, January 2011 to September 2012. AC1=Applicator subcontractor.

Contractor	01/11	02/11	03/11	04/11	05/11	06/11	07/11	08/11	09/11	10/11	11/11	12/11	01/12	02/12	03/12	04/12	05/12	06/12	07/12	08/12	09/12	2009-2012
AC01							134.00	233.00	227.00	162.00						150.00	103.00	-	191.50			1,896.35
AC02							138.00	246.00	260.50	262.00						107.00	311.00	160.50	235.50			1,720.50
AC03							-	-	-	-												363.35
AC04							-	-	-	-												448.85
AC05							-	-	-	-												500.10
AC06							100.50	183.50	207.00	172.00						128.50	297.00	212.00	171.00			1,924.85
AC07							120.00	185.50	204.00	199.50						160.00	273.00	229.00	236.50			1,989.50
AC08							141.50	215.50	237.50	271.00						95.00	280.50	244.50	259.00			1,907.50
AC09							121.00	176.50	189.00	146.00												632.50
AC10							127.00	208.50	224.50	218.50												778.50
AC11							141.50	233.00	209.00	186.00												769.50
AC12							125.00	237.50	247.00	288.00												897.50
AC13																150.00	335.50	236.00	209.50			931.00
AC14																128.00	218.50	162.00	230.00			738.50
AC15																111.50	317.00	168.50	139.00			736.00
AC16																151.00	288.00	237.00	206.00			882.00
AC17																156.50	246.00	151.00	189.00			742.50
AC18																	224.50	124.50	144.50			493.50
AC19																	107.00	193.50	80.00			380.50
AC20							97.50	177.50	209.50	216.00	16.00					68.00	221.00	248.50	159.50			1,791.25
AC21							80.00	141.50	194.00	211.00						60.00	248.50	212.00	216.00			1,645.00
AC22							51.00	130.50	117.00	129.00							93.00	178.00	189.50			1,195.00
AC23							52.00	137.00	185.00	202.50						53.00	260.50	268.50	241.50			1,400.00
AC24									136.50	195.50						72.00	259.00	215.50	205.50			1,084.00
AC25									43.00	172.50						52.00	211.00	197.50	104.00			780.00
AC26							7.00	111.50	115.50	217.50							128.50	40.00	58.00			808.00
AC27							-	50.50	117.00	150.00								80.50	-			398.00
AC28							6.00	114.50	-	-							-	-	-			120.50
AC29							-	72.50	79.00	-							-	-	89.00			240.50
AC30																	-	-	-			-
AC31																	176.00	122.00	119.00			417.00
AC32																	115.50	114.00	89.00			318.50
AC33							4.50	69.00	6.50	-												80.00
AC34							5.50	73.00	56.50	101.00			40.00				111.00	82.50	130.00			599.50
AC35			11.00	4.50					15.50	-								-	-			31.00
AC36			27.50	33.00					60.50	38.50							76.00	105.50	122.00			463.00
AC37			31.00	17.50					48.50	9.00								63.00	114.00			283.00
AC38			19.00	16.00					35.00	9.00								-	-			79.00
AC39			16.00	-					16.00	-								-	-			32.00
AC40																		-	-			-
AC41																		29.50	20.00			49.50
AC42																	83.50	166.50	123.00			373.00
AC43																		181.50	141.50			323.00
AC44																		154.50	137.00			291.50
AC45																	56.50	158.50	132.50			347.50
AC46									4.00	66.70							72.00	151.00	72.50			366.20
AC47																	62.00	168.50	61.00	43.50		335.00
AC48																	-	-	-			-
AC49																	-	-	-			-

Table 9. Documented cogongrass by the ACCC, including ineligible records.

County	Patches	Total acres	Mean patch size (ac)
Autauga	4	0.2	0.041
Baldwin	3,935	574.3	0.146
Bibb	10	0.2	0.025
Bullock	10	0.8	0.080
Butler	48	6.9	0.144
Choctaw	905	63.1	0.070
Clarke	985	28.6	0.029
Coffee	63	3.7	0.058
Conecuh	483	34.0	0.070
Coosa	6	0.3	0.056
Covington	851	98.8	0.116
Crenshaw	56	6.6	0.118
Dale	3	0.2	0.077
Dallas	339	22.1	0.065
Escambia	1,230	67.5	0.055
Fayette	2	0.1	0.055
Geneva	94	8.6	0.092
Greene	1,748	76.5	0.044
Hale	2,013	41.1	0.020
Houston	30	1.6	0.055
Jefferson	1	0.0	0.019
Lamar	3	0.2	0.070
Lee	1	0.1	0.117
Lowndes	31	4.6	0.148
Macon	15	1.3	0.090
Marengo	3,038	95.3	0.031
Mobile	1,506	499.8	0.332
Monroe	4,042	173.7	0.043
Montgomery	13	0.9	0.071
Perry	490	18.3	0.037
Pickens	203	12.8	0.063
Pike	69	5.2	0.076
Sumter	2,064	102.3	0.050
Tallapoosa	3	0.4	0.124
Tuscaloosa	28	0.3	0.011
Washington	1,962	199.1	0.101
Wilcox	547	26.2	0.048
TOTAL	**26,831**	**2,175.9**	**0.077**

Table 10. Documented cogongrass by the ACCC with ownership established.

Program	Patches	Total acres	Mean patch size (ac)
Autauga	4	0.2	0.041
Baldwin	3,858	559.1	0.145
Bibb	10	0.2	0.025
Bullock	10	0.8	0.080
Butler	47	6.9	0.147
Choctaw	905	63.1	0.070
Clarke	959	28.2	0.029
Coffee	64	3.7	0.058
Conecuh	231	19.6	0.085
Coosa	7	0.3	0.049
Covington	843	98.7	0.117
Crenshaw	56	6.6	0.118
Dale	3	0.2	0.077
Dallas	358	22.6	0.063
Escambia	1,182	65.4	0.055
Fayette	2	0.1	0.055
Geneva	127	10.8	0.085
Greene	1,752	75.9	0.043
Hale	2,004	40.7	0.020
Houston	30	1.6	0.055
Jefferson	1	0.0	0.019
Lamar	6	0.4	0.070
Lowndes	36	7.3	0.203
Marengo	3,028	94.2	0.031
Mobile	1,483	499.5	0.337
Monroe	3,934	169.3	0.043
Montgomery	14	0.9	0.067
Perry	536	18.3	0.034
Pickens	190	10.9	0.057
Pike	72	5.3	0.073
Sumter	2,061	102.2	0.050
Tallapoosa	3	0.5	0.159
Tuscaloosa	27	0.3	0.011
Washington	1,958	199.1	0.102
Wilcox	461	21.7	0.047
Total	**26,262**	**2,134.7**	**0.081**

Table 11. Documented cogongrass (number, total acres, mean spot size, and proportion) by the ACCC by overstory cover type.

Cover Type	Patches	Acres	Mean Spot Size (ac)	% of total
Cedar-Cypress-Juniper	1,100	41	0.04	4%
Clearcut	864	115	0.13	3%
Hardwoods	1,874	158	0.08	7%
Loblolly	9,099	582	0.06	34%
Longleaf pine	1,218	162	0.13	5%
Mixed pine	652	75	0.11	2%
Mixed pine-hardwoods	3,480	419	0.12	13%
Open field	7,710	406	0.05	29%
Shortleaf pine	179	20	0.11	1%
Slash pine	594	191	0.32	2%
Unknown	56	7	0.13	0%
Virginia pine	5	0	0.07	0%
Grand Total	**26,831**	**2,176**	**0.08**	**100%**

Table 12. Documented cogongrass patches (total number and acreage) by herbicide prescriptions as recorded by Scout subcontractors, 2009-2012.

Herbicide Prescription	Patches	Acres
Aquatic Glyphosate	2,166	126.6
Glyphosate only	10,423	1,129.4
Imazapyr only	13,913	894.1
No Treatment	329	25.9
Grand Total	**26,831**	**2,175.9**

Table 13. Treated cogongrass patches (total number and acreage) by herbicide prescriptions as recorded by Applicator subcontractors, 2009-2012. These data may include multiple patches, considered as one treated patch by the Applicator.

Herbicide Prescription	Patches	Acres
Aquatic Glyphosate	1,248	89
Glyphosate only	5,834	516
Imazapyr only	9,058	701
No Treatment	5	<1
Grand Total	**16,145**	**1,306**

Table 14. Number of unique cogongrass patches and associated number of treatments, 2009-2012.

One treatment		*Two treatments*		*Three treatments*		*Received at least one treatment*	
Patches	**Acres**	**Patches**	**Acres**	**Patches**	**Acres**	**Patches**	**Acres**
6,598	397	9,054	822	493	91	16,145	1,310

Table 15. The amount of dead cogongrass leaves for cogongrass patches treated 2 times or more by the ACCC, sampled August 2012.

Dead leaves	**Glyphosate (*n*=94)**	**Imazapyr (*n*=112)**	**Aqu. Glyphosate (*n*=6)**	**Average of all sites (*n*=212)**
100%	41%	59%	33%	50%
81-99%	52%	41%	67%	46%
61-80%	5%	<1%	0%	3%
41-60%	0%	0%	0%	0%
21-40%	0%	0%	0%	<1%
1-20%	1%	0%	0%	<1%
Total	100%	100%	100%	100%

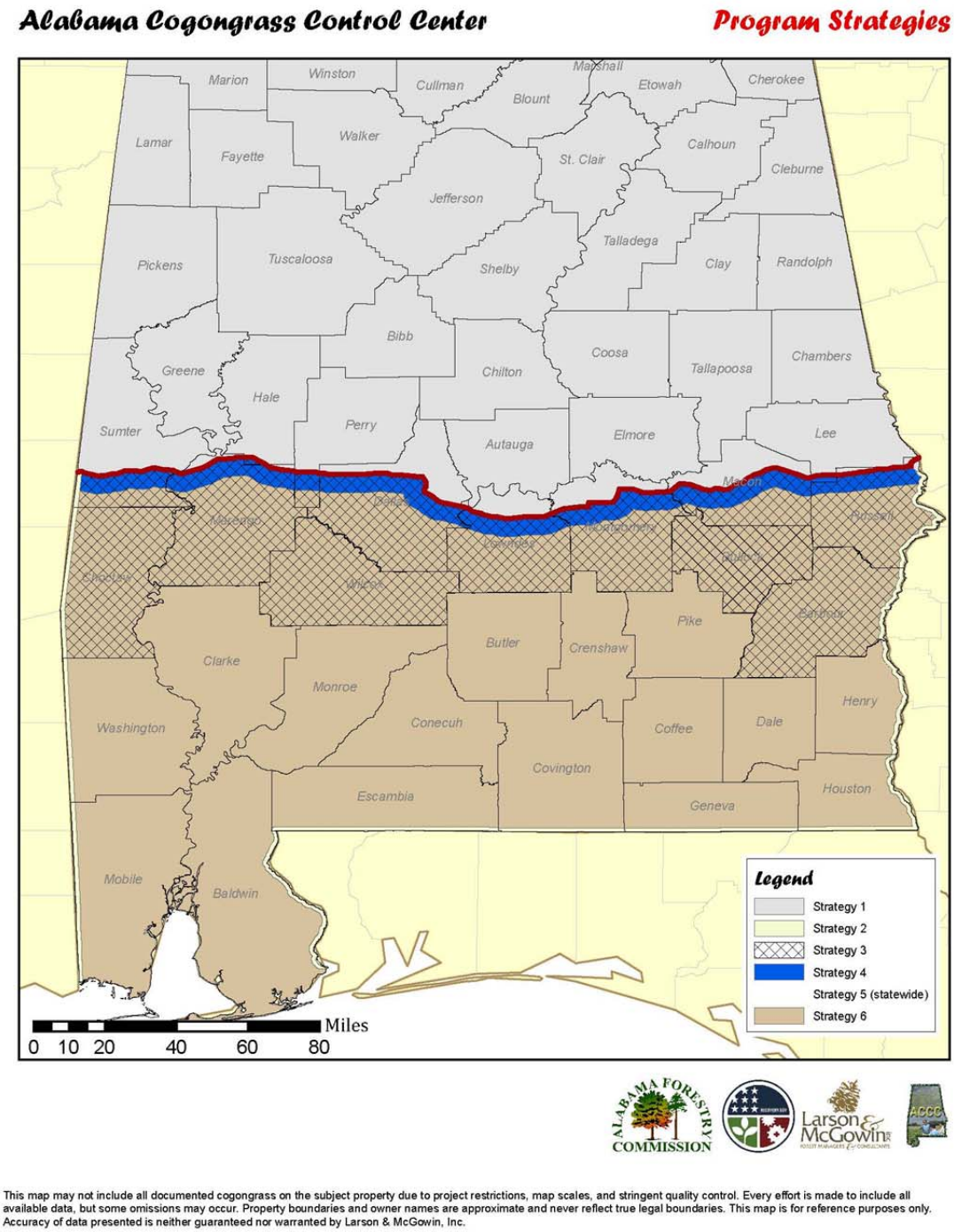
Table 16. Rhizome vitality for cogongrass patches where no green leaves were found. Sampled sites are patches that received 2 or more herbicide treatments by the ACCC.

Rhizome Status	**Glyphosate (*n*=39)**	**Imazapyr (*n*=65)**	**Aqu. Glyphosate (*n*=2)**	**Average of all sites (*n*=106)**
No rhizomes	77%	49%	50%	59%
Mix live-dead	23%	49%	50%	40%
Live rhizomes	0%	2%	0%	1%
Total	**100%**	**100%**	**100%**	**100%**

Table 17. Cover distribution of remnant green leaves for cogongrass patches that received 2 or more herbicide treatments by the ACCC.

Live Grass Distribution	**Glyphosate (*n*=54)**	**Imazapyr (*n*=46)**	**Aqu. Glyphosate (*n*=4)**	**Average of all sites (*n*=104)**
Uniform	7%	0%	0%	4%
Clumped	63%	57%	50%	60%
Strips	15%	30%	0%	21%
Halo	15%	13%	50%	15%
Total	**100%**	**100%**	**100%**	**100%**

IX. Figures



This map may not include all documented cogongrass on the subject property due to project restrictions, map scales, and stringent quality control. Every effort is made to include all available data, but some omissions may occur. Property boundaries and owner names are approximate and never reflect true legal boundaries. This map is for reference purposes only. Accuracy of data presented is neither guaranteed nor warranted by Larson & McGowin, Inc.

Figure 1. Statewide map showing strategy boundaries for the ACCC.

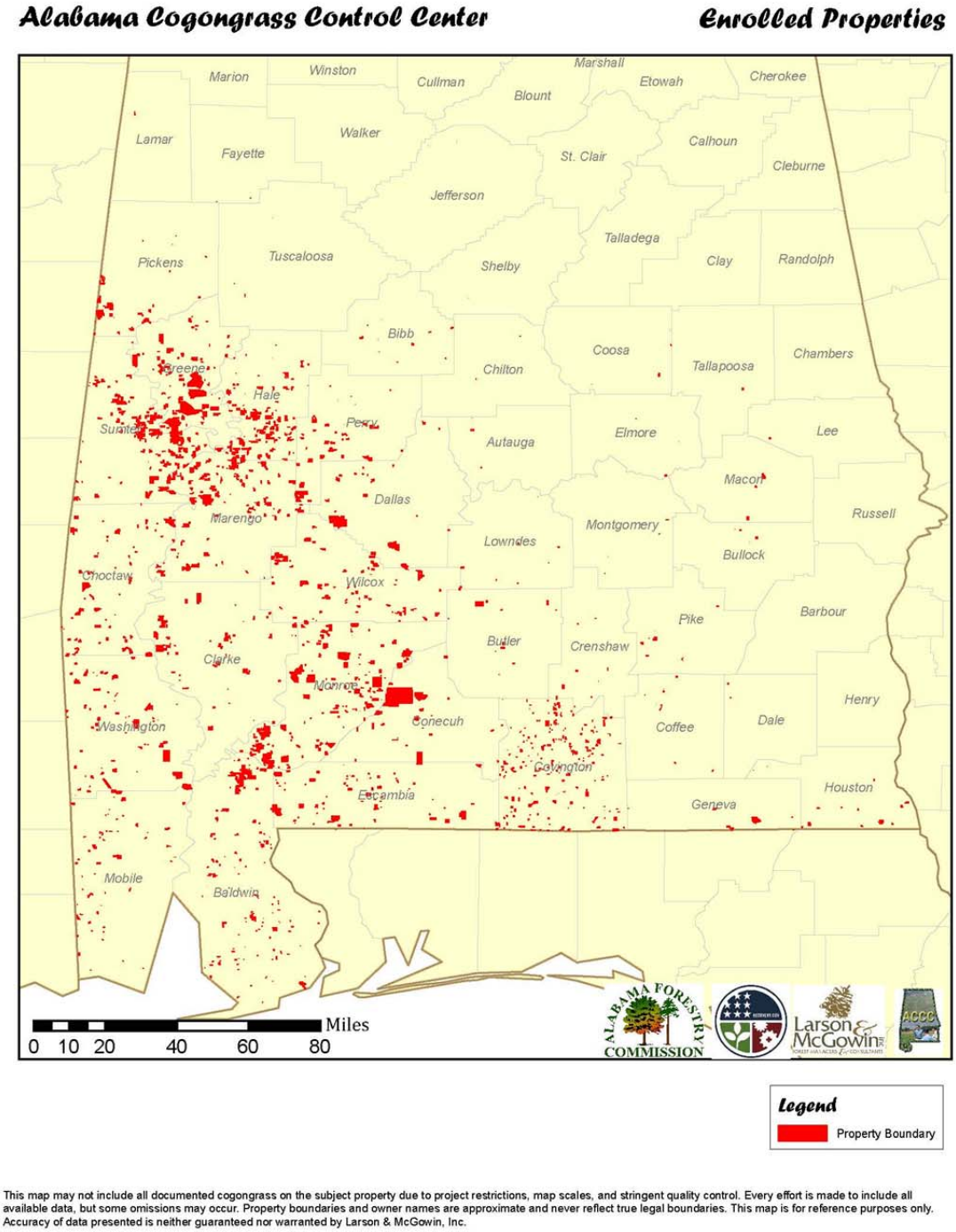


Figure 2. Statewide map showing enrolled properties in the ACCC.

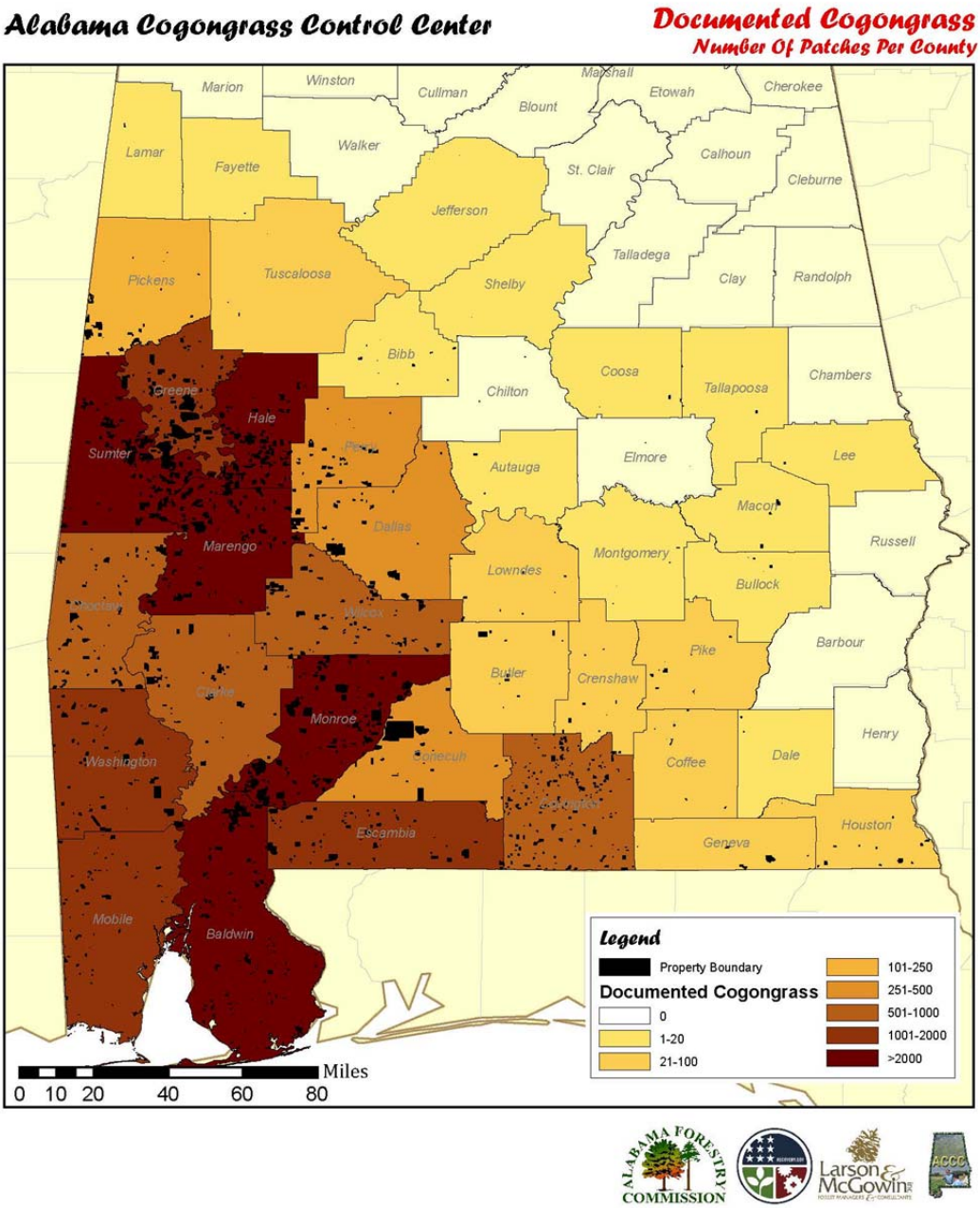


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Figure 3. Number of cogongrass patches documented per county for the ACCC, 2009-2012.

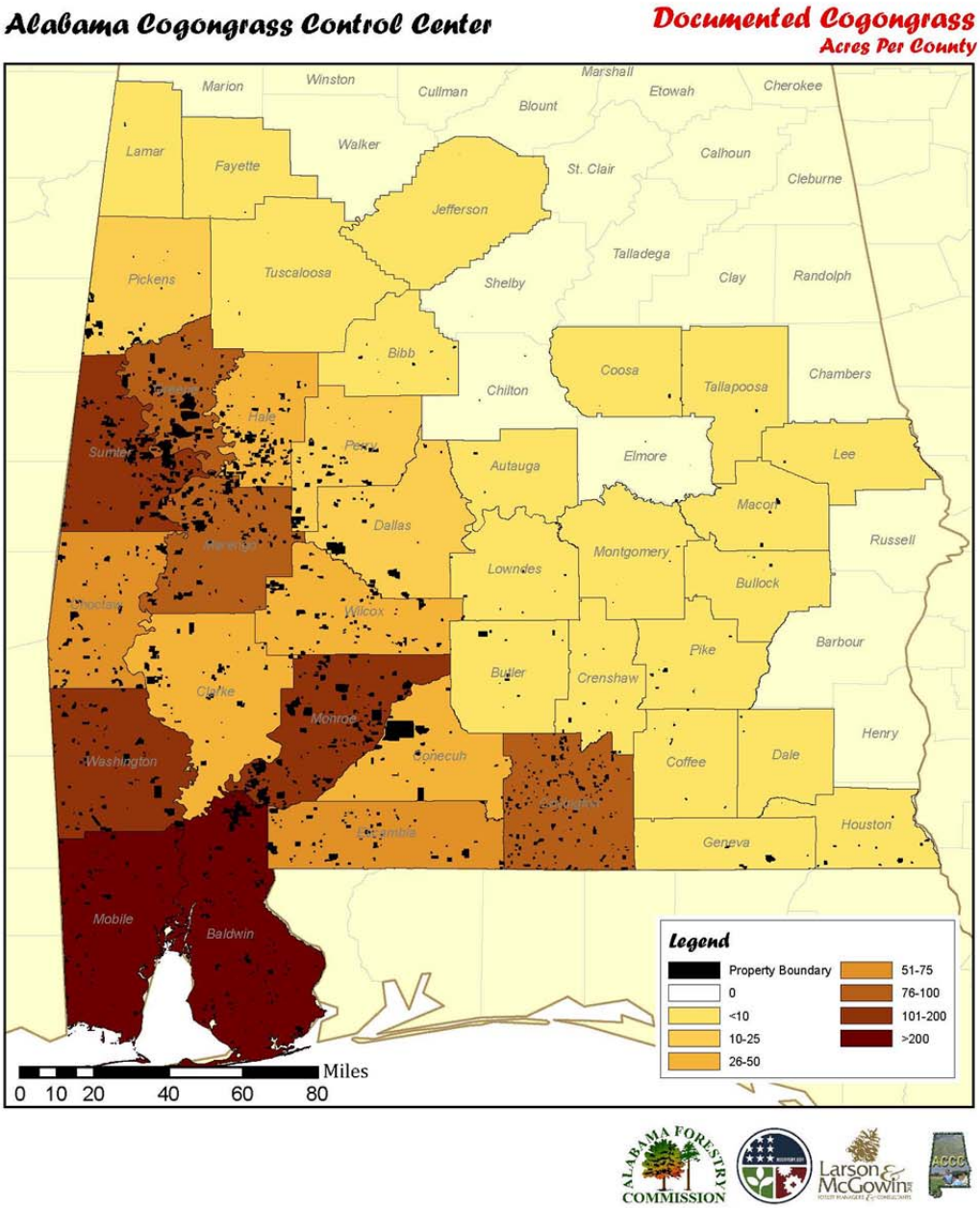

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Figure 4. Total acres of cogongrass documented per county for the ACCC, 2009-2012.

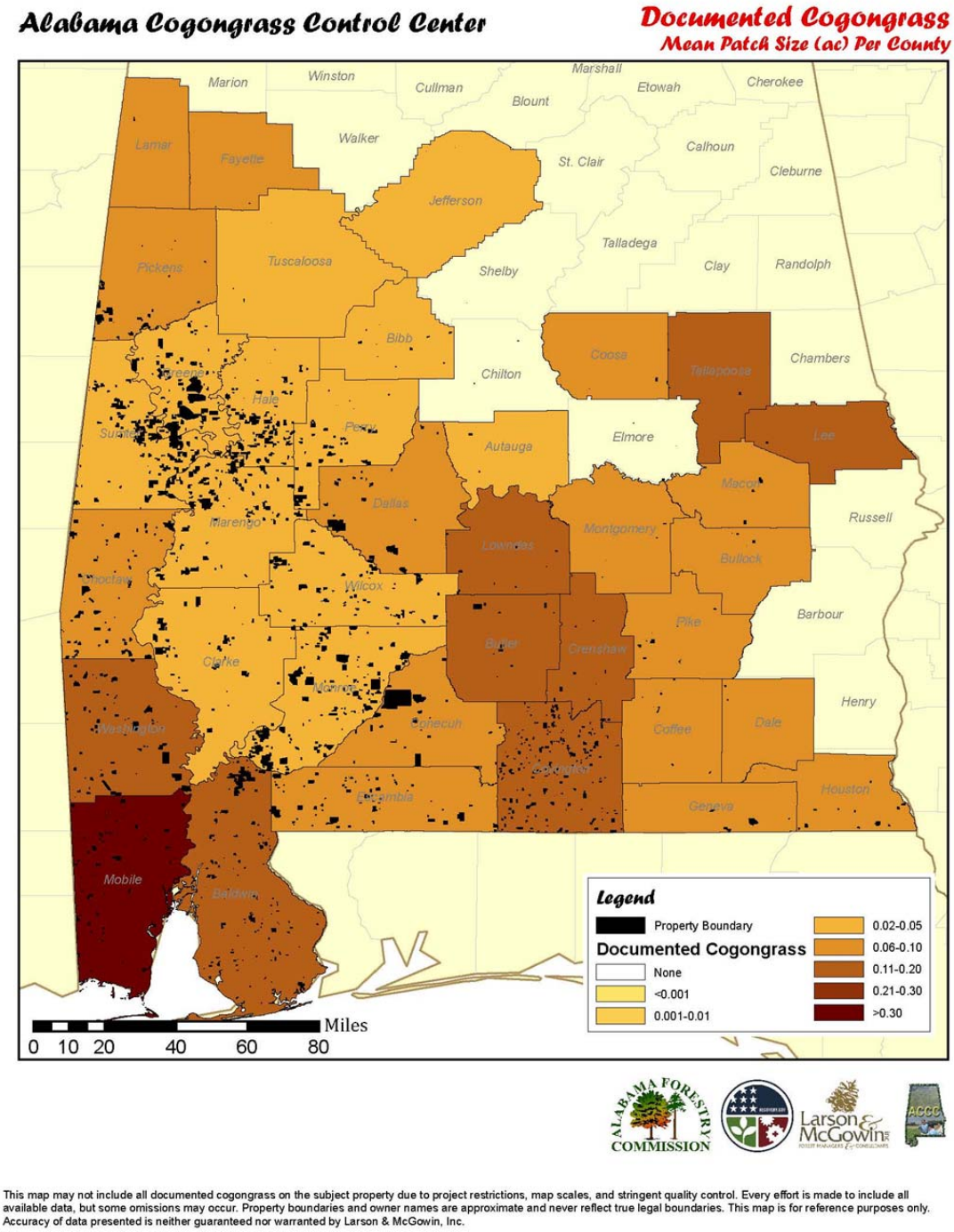

Figure 5. Average (mean) patch size of cogongrass per county for the ACCC, 2009-2012.

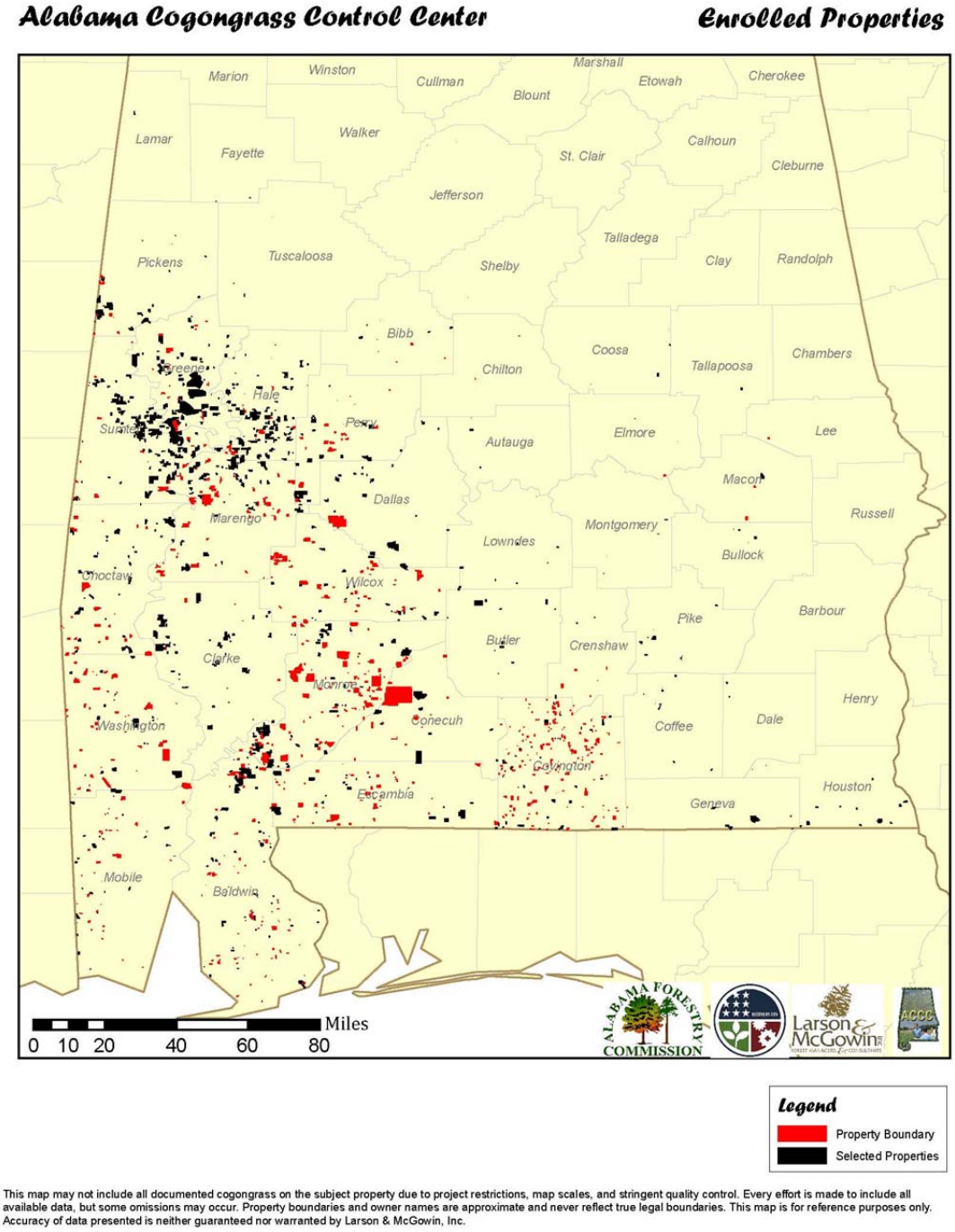

Figure 6. Enrolled properties for the ACCC, 2009-2012. Properties selected for herbicide treatment of cogongrass are noted in black.

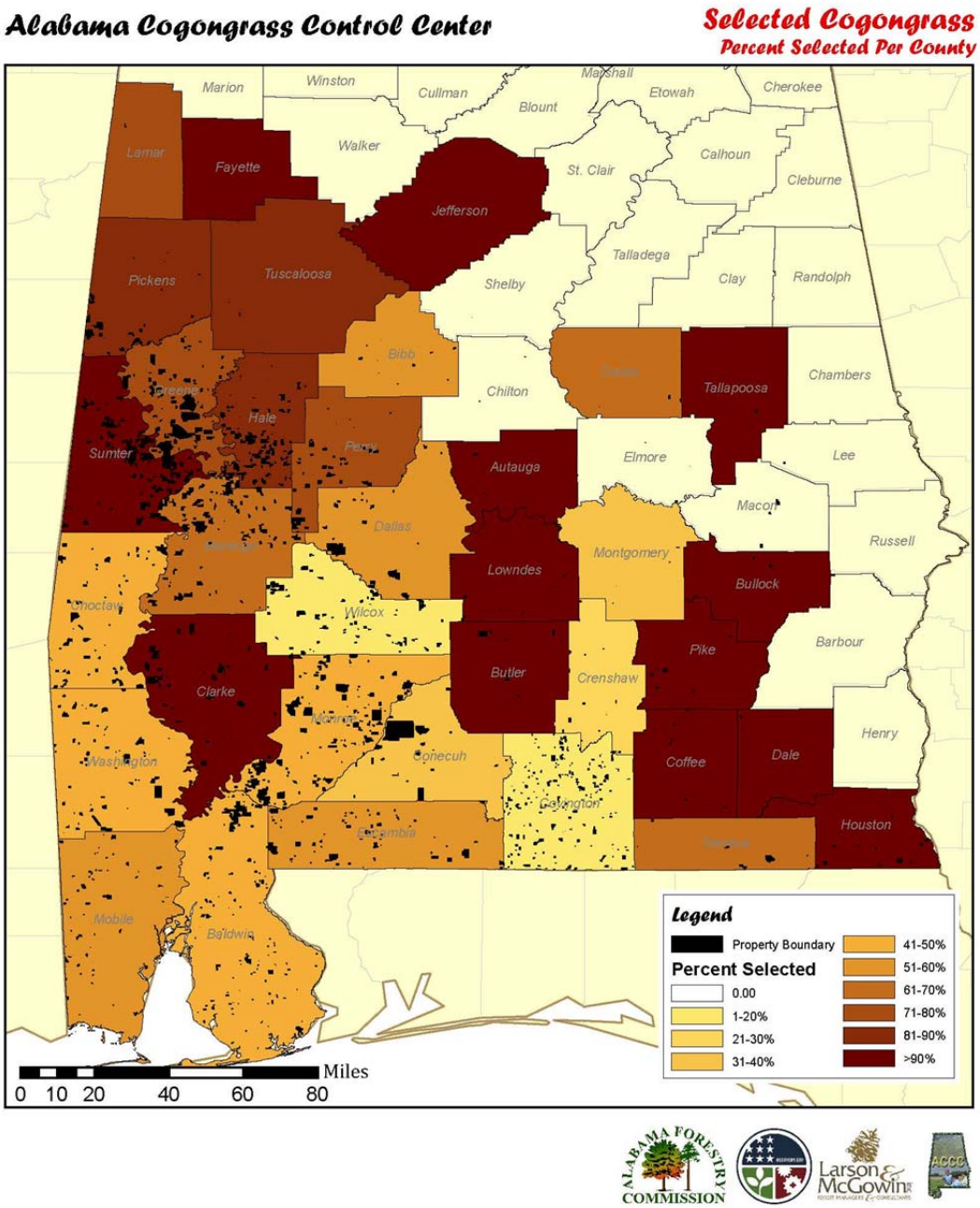

Figure 7. Percent of properties selected for each county in the ACCC, 2009-2012. The proportion is based on the total number of patches in a single county.

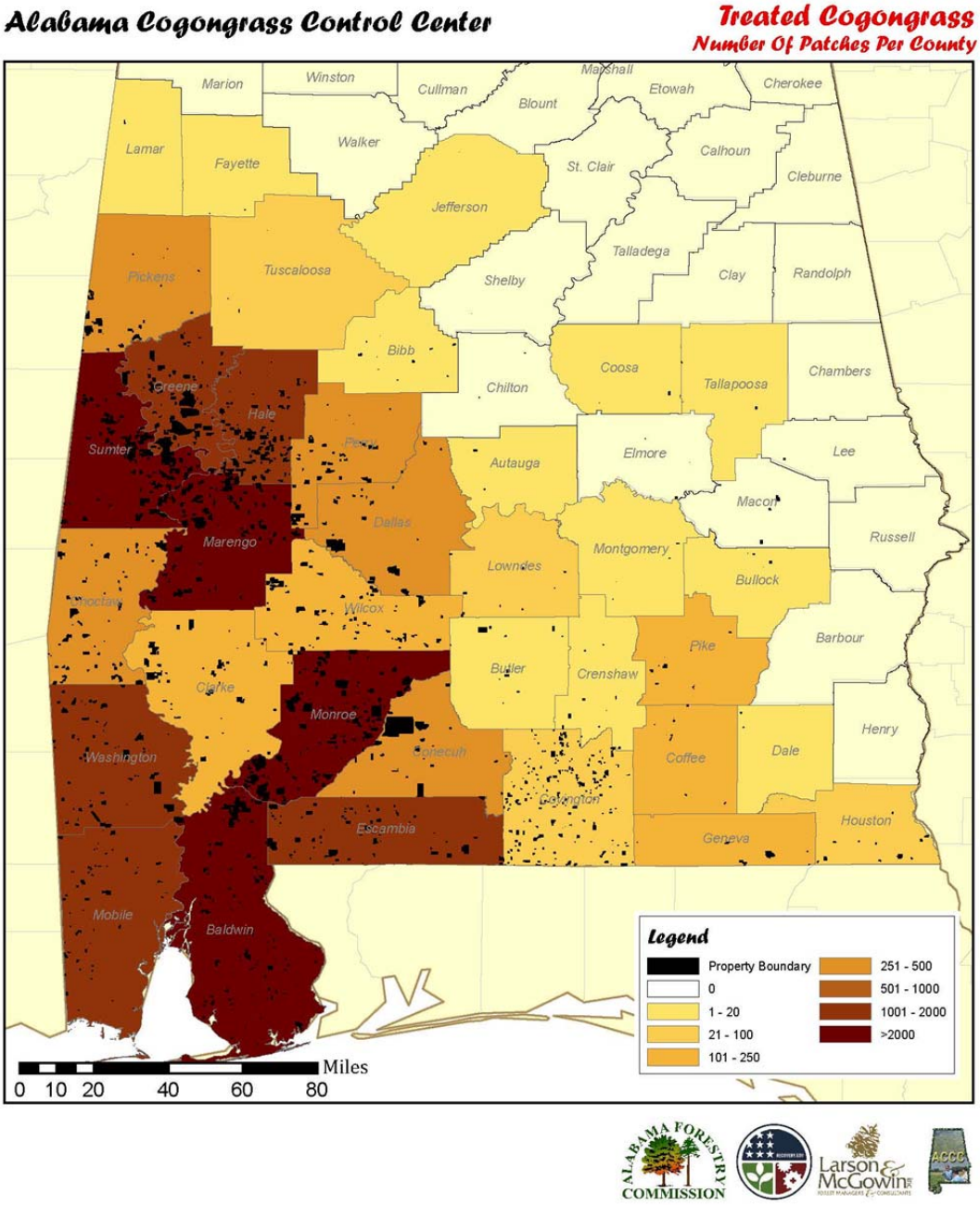

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Figure 8. The total number of patches treated by herbicide contractors per county for the ACCC, 2009-2012.

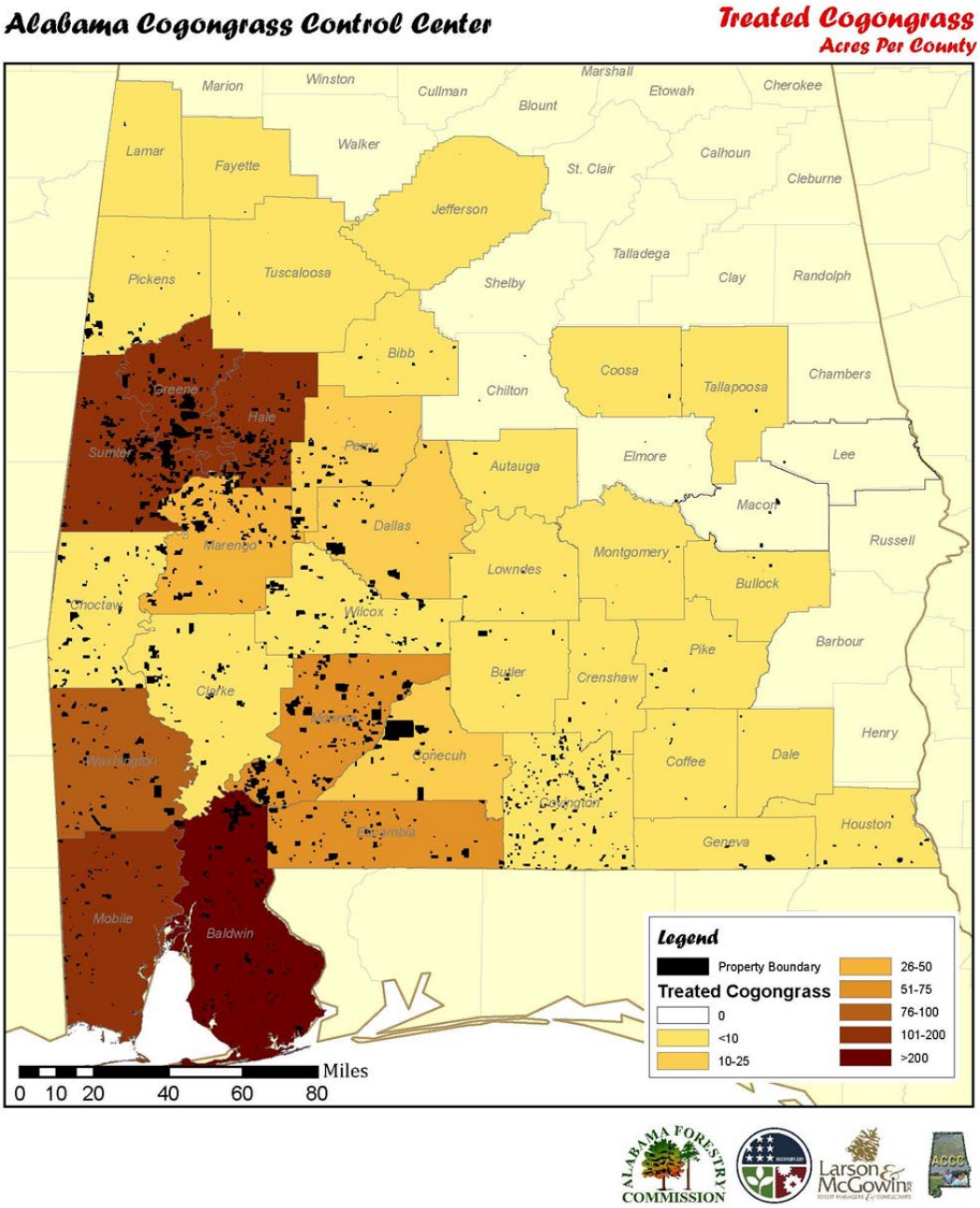

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Figure 9. The total acreage of cogongrass treated per county by the ACCC, 2009-2012.

X. Appendix

ACCESS AGREEMENT FOR COGONGRASS TREATMENT

KNOW ALL MEN BY THESE PRESENTS, that on this the ___ day of _____, 20___, the undersigned _____, as the owner of the property identified below, or the authorized agent thereof, hereinafter "Landowner," does hereby grant to Larson & McGowin, Inc. and others designated below, a right of access to the property for the purpose of treating the infestation of cogongrass thereon, on the following acknowledgements, terms and conditions:

WHEREAS, Larson & McGowin has been awarded a contract by the Alabama Forestry Commission ("AFC") to serve as Program Coordinator for Alabama's War on Cogongrass;

WHEREAS, cogongrass, Imperata cylindrica (L.), is a non-native, invasive plant considered to be one of the most invasive weeds in the world, the control of which will be in the best interest of Landowner and the State of Alabama;

WHEREAS, the property of Landowner is known or believed to have an infestation of cogongrass and Landowner desires the treatment thereof by herbicide application;

WHEREAS, as Alabama's Cogongrass Program Coordinator, Larson & McGowin, in consultation with the AFC, either directly or through subcontractors, vendors, or other designees, has the necessary skill, equipment, personnel, and licenses to identify, map, treat, and audit the treatment of cogongrass;

NOW, THEREFORE, in consideration of benefits derived from the treatment of cogongrass on Landowner's property, Landowner grants access to the property to Larson & McGowin and others designated below, and further agrees as follows:

1. The property made the subject of this Agreement is identified as follows: _____ _____ located in_____ County. Landowner warrants that Landowner is the owner of the property or is the authorized agent of the owner, and has full authority to grant the license and permission and make the other agreements provided for herein.

2. Landowner hereby grants a license and permission to enter the property for the purpose of making herbicide treatments to cogongrass and for all associated purposes including, without limitation, identifying and mapping the infestation, the treatment and re-treatment of cogongrass, and auditing the effectiveness of treatments and/or re-treatments. Such license and permission shall be for the duration two years from the date of this Agreement; provided, however, Landowner may terminate this Agreement by giving written notice of such termination by certified mail to Larson & McGowin, c/o Ernest Lovett, P.O. Box 2143, Mobile, AL 36652. Termination shall be effective upon receipt of such notice.

3. The license and permission granted herein shall extend to Larson & McGowin, the AFC, and their employees, officers, contractors, subcontractors, vendors, and auditors.

4. Landowner agrees to cooperate in identifying areas infested with cogongrass and identifying the boundaries of the property in areas where the infestation may overlap Landowner's property and property of others.

5. Because the costs of treatment are being funded by the AFC with funds granted under the 2009 American Recovery and Reinvestment Act, Landowner agrees not to apply or qualify for additional federal cost share programs for the control of cogongrass for the same acreage treated/re-treated in any year pursuant to this Agreement. Landowner further acknowledges that because the treatment is being funded by federal grant, information as to the location, size and extent of infestation, the chemical(s) and amounts thereof used, and other operational information collected by Larson & McGowin and its contractors will be compiled and stored in an electronic data base and may be accessed by auditors or inspectors of the AFC, U.S. Forest Service, or other governmental agencies.

6. Landowner does hereby release Larson & McGowin, the AFC, and their officers and employees from any and all claims, demands, causes of action, and/or liabilities of any nature whatsoever arising from acts or omissions of any person or entity in any manner relating to this Agreement. Landowner hereby releases the contractors, subcontractors, and vendors of Larson & McGowin from any claims, demands, causes of action, and/or liabilities of any nature whatsoever arising from acts or omissions committed directly in the performance of the services for which they were contracted or engaged.

7. Landowner agrees that this Agreement shall be binding on Landowner's successors and assigns, and that during the effective period of this Agreement Landowner will give notice thereof to the purchaser of any portion of or an interest in the property.

IN WITNESS WHEREOF, the Landowner has executed this Agreement as of the date set forth above.

LANDOWNER

Signature: _____ Address: _____

Printed Name: _____ Telephone: _____

Title (If Applicable): _____ Cell Phone: _____

E-Mail: _____

ALABAMA COGONGRASS CONTROL CENTER

ARRA COGONGRASS PROGRAM GUIDELINES

Definitions

The requirements and guidelines outlined in this document ("Guidelines") concern the operations of the Alabama Cogongrass Control Program (the "Program") which is funded by a 3-year, $6.2 million grant to the Alabama Forestry Commission ("AFC") through the American Reinvestment and Recovery Act ("ARRA", also known as the Stimulus bill). Larson & McGowin, Inc. (the "Coordinator") is overseeing the administration of the Project across the state of Alabama with input from the AFC and a consortium of cogongrass experts from multiple departments, entities, and private companies ("Technical Committee"). The Program is divided into six sub-programs ("Strategies"), each with different geographic coverage, objectives, and funding levels.

Private, non-industrial landowners (the "Landowner") may enroll their property (the "Property") into the Program so that a portion or all acreage where cogongrass is currently established ("Infestation") can be treated using chemical or mechanical means ("Treatment") and fully removed from the geographic area, documented by the lack of living cogongrass rhizomes ("Eradication"). Landowners who enroll and are accepted into the Program to receive Treatment of Infestations are called "Participants". The Coordinator will contract the services of private individuals or companies to inspect the Property and verify treatment options (the "Scout"), conduct chemical and/or mechanical applications (the "Vendor"), or perform internal inspections and audits to confirm adherence to contractual and safety guidelines (the "Auditor"). Landowner, Participant, and Treatment records will be maintained in a master Geographic Information System ("GIS") database.

For the purposes of the Program, there is a boundary that traverses the state of Alabama that delineates 2 major operational zones ("Demarcation Line"), is set by the AFC, the Technical Committee, and the Coordinator, and is subject to change at any time. The Demarcation Line is very important. In the area of Alabama north of the Demarcation Line, the Program will attempt to eradicate cogongrass from land owned by Participants, subject to any restriction or funding. In general, south of the Demarcation Line there is a maximum acreage of cogongrass treated per landowner, subject to any restriction or funding. The specific location of the Demarcation Line is described in the section Program Guidelines.

The Guidelines are subject to change at any time, and the most recent version will be posted on the program website for perusal. The Guidelines should only serve as a general description of how the Program is intended to work and should not be construed as a legal agreement between any parties mentioned in this document. The use of trade names is for the information and convenience of the reader and does not imply official endorsement or approval by the AFC, Technical Committee, or the Coordinator of any product to the exclusion of others that may be suitable.

Basic Eligibility Requirements - Landowner

1. Only private, non-industrial landowners are eligible for this Program. The Landowner may be a private individual, joint owner, a non-profit organization, or a corporation that is not a wood-using industry and has no publicly traded stock. Only Landowners meeting these criteria and officially enrolled in the Program are hereinafter referred to in this document as "Participants".
2. Only Alabama Properties will be treated in the Program, and all 67 counties are included in the Program.
3. Only one Property owned by the Landowner can be enrolled in the Program.
4. The Landowner need not reside on said Property to enroll, and the Landowner can reside in another state. At least one name on the Property deed, however, must match the name of the applicant for the Property.
5. There is no minimum or maximum acreage ownership requirement to enroll in the Program. However, for some Strategies (Strategies 3, 4, 5, and 6) there is a maximum total (composite) acreage of Infestations *treated* per Participant. Strategy details will be covered in the section "Program Strategies".
6. Specific acreages, i.e., not entire Properties, currently enrolled in the Conservation Reserve Program (CRP), EQIP, or other programs that may prohibit receipt of federal cost-share funds from more than one source for the same acreage are not eligible for treatment under the Program. In other words, portions of a Property that are currently enrolled in cost-share programs for cogongrass treatment are not eligible for the Program.

Basic Eligibility Requirements – Vendor and Auditor

1. Vendors and Auditors can be individuals or businesses that have a current and valid commercial pesticide applicator license from the state of Alabama[1] and have a current and valid liability insurance policy for at least $1,000,000 (one million) dollars per occurrence. Proof (photocopies and faxes are acceptable, provided they are legible) of the license and policy must be provided to the Coordinator prior to contracting.
2. Vendors must have experience in chemical or mechanical treatment of cogongrass in a variety of conditions. Examples include rights-of-way, residential areas, plantations, or agricultural areas.
3. Auditors must have experience in detection of cogongrass under varying conditions and in assessment techniques for chemical or mechanical applications such as herbicides and tilling. Auditors must also have a strong working knowledge of standard safety practices.
4. Vendors and Auditors must provide a list of three professional references to the Coordinator prior to contracting.
5. Preference will be given to those persons or companies that reside in or have business addresses in Alabama.
6. Full requirements of Vendors and Auditors can be found in the respective job descriptions posted on the Program website.

[1] http://aec.army.mil/usaec/pest/cert-al.html#2

General Program Guidelines

1. Landowners who meet the eligibility requirements to become a Participant can submit a completed and signed application form to the Coordinator using several approaches, including online form, email, regular mail, or fax. See the section entitled "Contact Information" for details.
2. Submittal and receipt of an application to the Coordinator **does not** guarantee acceptance into the Program, becoming a Participant, and subsequent Treatment, even if the applicant meets all the given criteria. Acceptance of a Property for Treatment will be based on several factors, including remaining funds available to meet current Treatment agreements and Strategy requirements, verification of legal ownership and status, and verification of at least one Infestation on said Property.
3. The Coordinator will decide into which Strategy the Property is placed based on available data. A Participant will be in only one Strategy.
4. Only one application per Landowner is required for the life of the Program. If an individual owns land (in full or in part) in the name of more than one legal landowning entity, application should be made on behalf of only one of those entities. The intentional enrolling of more than one Property by a Landowner into this Program could result in immediate expulsion from the Program.
5. Cogongrass must be verified and documented at a particular longitude and latitude coordinates to receive Treatment. This can be provided by the Landowner but otherwise will be collected by the Scout or Coordinator. If cogongrass is not verified on a site, no Treatment will occur. The Scout and/or Coordinator will make this determination.
6. The Scout will make the determination of the best Treatment for the specific area and may ask the Participant or their legal representative if there are certain plants that must be considered during development of the Prescription. This will affect the choice of herbicides and possibly the chemical treatment of that area. The specific geographic area to be treated will be documented as longitude and latitude coordinates prior to Treatment and must be agreed upon in a legally binding contract between the Participant and the Coordinator or their legal representatives.
7. Only Infestations for which the entire contiguous Infestation can be treated will receive Treatment from the Program. To treat Infestations which encroach on public right-of-way land or adjacent private property, the Landowner must submit a Hold Harmless Agreement form signed by the respective Landowner or authorized land manager. It will be the Landowner's responsibility to have this form completed, signed, and returned to the Coordinator before the commencement of any Treatment.

General Treatment Guidelines

1. Due to the chemical nature of herbicides some non-target plants, i.e., other than cogongrass, may be injured or killed during Treatment of acreage sprayed by the Vendor. Typically this is confined to the area where herbicide is applied but, depending on rainfall and other factors, runoff may occur onto non-cogongrass areas. The Coordinator will not be held liable for any damages that may occur as a result of herbicide movement from the area sprayed by the Vendor. The herbicide(s) chosen will be selective, highly targeted, and have the narrowest range of effect on non-target plants as possible.
2. Individual Infestations will receive Treatment through either chemical or mechanical application. An additional six to ten-foot-wide buffer beyond the furthest observed cogongrass plant will also be treated. This serves to encompass all possible cogongrass plants that make up the Infestation and to lower subsequent regeneration ("halo effect") that is well known to occur after Treatment. The Treatment will be determined at the time of the initial site visit and verification of cogongrass by the Scout. The specific choice of chemical or mechanical Treatment as a management prescription will depend on several factors including, but not limited to:
    a. Proximity to water bodies or sources
    b. Size of Infestation and depth of rhizome mat
    c. Proximity to specific plants in or very near the Infestation (within 20 feet or so) that the Participant wishes to not have damaged by the Treatment[2]
    d. Terrain or topography
    e. Proximity to domesticated animals, homesites, playgrounds, or special/unique sites
    f. Participant wishes within reason[3]
3. The Program will attempt Eradication of cogongrass from the specific area or areas as specified in the contract, i.e., *not the entire Property*, and the Coordinator will make every effort to ensure that adequate Program funds remain to treat all enrolled Infestations. However, because the Program is a large-scale effort funded by a finite government grant there is no guarantee that every Infestation for every Participant will be Eradicated.
4. Infestations will be first treated between approximately June 1 and October 31 (or until 2 weeks prior to the region's typical first frost) of each year. The Coordinator will make the final determination of when Treatment commences and ends each calendar year.
5. The Treatment must be repeated the next year, between approximately July 1 and October 31 (or first frost) of the second year, unless the Infestation is fully eradicated after the first year of Treatment, as confirmed by the Scout or Coordinator. If subsequent Treatment, Auditing, and Monitoring cannot be conducted the specific Infestation will not be treated at all.
6. The maximum total acreage treated per Participant is determined by each Strategy and funds remaining (covered in the section "Program Strategies"). This is a composite of all Infestations on each Property. As an example, suppose a Participant is enrolled in Strategy 6 and all the Infestations on the Property combined equals 12.2 acres. In this case 10 acres of Infestations would be treated through the Program, leaving 2.2 acres untreated by the Program. Should

[2] An example would be the presence of mature live oaks that provide a valuable food, shade, or aesthetic source to the Participant. In this specific example, only glyphosate (Roundup) would be used as it does not usually harm this species of tree; imazapyr is well known to injure or kill many deciduous trees and herbaceous understory plants and demonstrates some soil activity. The Coordinator and Scout will always err on the side of doing the least harm to non-target plants.
[3] The Coordinator will take individual requests into account, but if these prevent Eradication the Program will not perform a Treatment of that Infestation.

any Infestations be out of the scope of Treatment by the Program, the Participant is encouraged to enter into a separate agreement with the Vendor. The Program will not be part of any such Agreement.

7. Infestations treated through the Program must be monitored and possibly retreated for at least two consecutive years, unless full eradication of the infestation is achieved after the first year, as confirmed by the Scout or Coordinator. It is understood that signing of the Treatment and Access contract by the Landowner allows the Coordinator to access the Property for purposes of retreatment and monitoring.

Program Strategies

Because of limited funding, a large number of Infestations on private non-industrial lands in Alabama, and diverse land ownerships the Coordinator has divided the Program into six Strategies that will encompass a wide variation of land management ethics and objectives. While all Alabama counties are included in the overall Program, some counties are not in certain Strategies. This is to better meet each Strategy's objectives and to serve Participants most effectively.

In general, the state is divided into 2 zones: north and south. The Demarcation Line (as noted in the Definitions section) between these 2 zones, as of January 1, 2011, is US Highway 80 between the AL/MS and AL/GA state lines. In the northern zone (north of US Highway 80) the Program intends to create a cogongrass-free area on Enrolled Properties covering several counties. In the southern zone (south of US Highway 80) the Program will use multiple Strategies to create cogongrass-free zones, provide assistance to underserved and limited income Participants, and provide partial control of cogongrass for an Enrolled Property. To better understand how the Landowner may fit into the Program, each of the six Strategies will be explained in turn.

Strategy 1. Eradicate

1. Counties where active: Autauga, Bibb, Blount, Calhoun, Chambers, Cherokee, Chilton, Clay, Cleburne, Colbert, Coosa, Cullman, Dallas, DeKalb, Elmore, Etowah, Fayette, Franklin, Greene, Hale, Jackson, Jefferson, Lamar, Lauderdale, Lawrence, Lee, Limestone, Lowndes, Macon, Madison, Marengo, Marion, Marshall, Montgomery, Morgan, Perry, Pickens, Randolph, Russell, St. Clair, Shelby, Sumter, Talladega, Tallapoosa, Tuscaloosa, Walker, and Winston; provided that the Enrolled Property is also north of US Highway 80.
2. Objective: Infestations will receive chemical treatments that will attempt to eradicate the plant from the counties listed in this Strategy. By doing so a cogongrass-free zone will be created in the northern half of the state, slowing or stopping the spread of cogongrass into these counties or states to the north, west, and east.
3. Eligibility: a) All private, non-industrial landowners that meet the Basic Eligibility Requirements; b) own land in full or part in any of the counties listed for this Strategy; c) north of the Demarcation Line and have documented Infestations on the Property at the time of submitting the Application form.
4. Ownership size requirement: none
5. Maximum acres treated: The primary objective of the Eradication program is to halt the spread of cogongrass to uninfested sites, including, but not limited to: private properties, transportation systems, waterways, and rights-of way. The vast majority of participants qualifying for the Eradication program will have cogongrass infestations that, in aggregate on the enrolled property, are of relatively small acreage. The Coordinator will make every effort to treat all cogongrass infestations on the enrolled property if qualified for the Eradication program. There may be rare instances where the aggregate acreage of cogongrass infestations on an individual participant's property is at a level where treating all of the infestations would put an undue burden on the ability to treat other participants in the Eradication program. Therefore, in the Eradication zone the maximum area that can be treated per landowner is set at 25 acres. The Coordinator has final authority, based on current knowledge, objectives, budget, and remaining financial resources available to this grant to modify this cap of treated acreage.
6. Enrollment open date: April 1, 2010
7. Enrollment close date: December 31, 2011 or until funding for enrolled Properties is exhausted. This will be determined by the money required to treat all known enrolled Infestations.
8. Percent allocated of total operational funding: 20.6%

Strategy 2. State Borders

1. Counties where active: Baldwin, Barbour, Choctaw, Covington, Escambia, Geneva, Henry, Houston, Mobile, Pickens, Russell, Sumter, and Washington
2. Objective: Infestations will receive chemical treatments that will attempt to eradicate the plant for the counties active in this Strategy. By doing so a narrow cogongrass-free zone will be created in the southern half of the state, slowing or stopping the spread of cogongrass into enrolled areas or states to the east, west, and south.
3. Eligibility: There are multiple requirements for eligibility: 1) all private, non-industrial landowners that own, in full or part, land in any of the counties listed above and south of the Demarcation Line; and 2) Infestation(s) eligible for treatment must be no more than one-quarter (0.25) mile or one thousand three hundred twenty (1,320) feet in linear distance (as measured from the geographic center of the Infestation) from the state of Alabama's established political borders with Georgia, Mississippi, and Florida. *Only Infestations within 0.25 miles of the state border on an enrolled Property will be treated, regardless of Property location or size.* For example, if the Landowner owns property in Choctaw County located on the state border with Mississippi but the linear distance from the closest Infestation to the border is 0.3 miles, the Property would not be eligible for this program.
4. Ownership size requirement: none
5. Maximum acres treated: The primary objective of the State Borders program is to halt the spread of cogongrass to uninfested sites, including, but not limited to: other states, private properties, transportation systems, waterways, and rights-of way. The vast majority of participants qualifying for the State Borders program will have cogongrass infestations that, in aggregate on the enrolled property, are of relatively small acreage. The Coordinator will make

every effort to treat all cogongrass infestations on the enrolled property if qualified for the State Borders program. There may be rare instances where the aggregate acreage of cogongrass infestations on an individual participant's property is at a level where treating all of the infestations would put an undue burden on the ability to treat other participants in the State Borders program. Therefore, in the State Borders zone the maximum area that can be treated per landowner is set at 25 acres. The Coordinator has final authority, based on current knowledge, objectives, budget, and remaining financial resources available to this grant to modify this cap of treated acreage.

6. Enrollment open date: April 1, 2010
7. Enrollment close date: December 31, 2011 or until funding for enrolled Properties is exhausted. This will be determined by the money required to treat all known enrolled Infestations.
8. Percent allocated of total operational funding: 12.4%

Strategy 3. Underserved and Limited Income Guidelines

1. Counties where active: Barbour, Bullock, Choctaw, Dallas, Greene, Hale, Lowndes, Macon, Marengo, Montgomery, Perry, Russell, Sumter, Wilcox
2. Objective: This Strategy is designed to assist underserved and limited income participants in counties listed above with known cogongrass Infestations. It will assist in understanding the extent of Infestations in the northern counties of Zone 2 and will mitigate the threat posed by small infestations. Qualified private consultants will provide mapping and control services. This Strategy will be first offered to landowners owning a total of 100 acres or less and then opened to all other eligible Landowners.
3. Eligibility: This strategy has multiple requirements for eligibility, and all requirements must be met to be enrolled in this Strategy:
    a. Private non-industrial Landowners who own Property, in full or part, in the counties specified above and south of the Demarcation Line;
    b. To meet the hazard mitigation needs of the limited resource forest landowner population within the State of Alabama the Program is adopting a system similar to the methodology employed by the Natural Resource Conservation Service[4]. More details will be found on our website and government sites that have programs for this particular service and is too numerous to mention here.

    Forest landowners that meet one or more of these criteria will be granted limited resource status. By receiving status as a limited resource forest landowner within the context of the ARRA grant described above the landowner agrees to classification of property they receive services on as a demonstration project that allows reasonable, unrestricted access to the property for the purpose of education and evaluation of persons or parties when escorted by AFC personnel or the Coordinator. When all conditions are met and an affidavit of agreement is executed the landowner is then entitled to receive the services prescribed by the Coordinator and compensation is routed directly to the vendor providing services.
4. Ownership size requirement: Initially restricted to Properties totaling 100 acres or less; this restriction will be removed when adequate response of small landowners has been achieved
5. Maximum acres treated: 10 acres over the entire Property with priority given to Property legal boundaries first, and then internal Infestations; or until Strategy funding is exhausted
6. Enrollment open date: July 1, 2011
7. Enrollment close date: December 31, 2011 or until funding for enrolled Properties is exhausted. This will be determined by the money required to treat all known enrolled Infestations.
8. Percent allocated of total operational funding: 10.3%

Strategy 4. Stop The Spread

1. Counties where active: Autauga, Dallas, Lowndes, Macon, Marengo, Montgomery, Perry, Russell, Sumter
2. Objective: This Strategy will be an effort to prevent new Infestations from migrating into Zone 1 using chemical herbicide treatments. The focus will be on main travel routes in Zone 2 moving into Zone 1. The effort will be to spray Infestations along road right-of-ways (ROWs) and connected Properties within 5 miles south of the Demarcation Line[5].
3. Eligibility: This strategy has multiple requirements for eligibility, and all requirements must be met to be enrolled in this Strategy:
    a. Private non-industrial Landowners who own Property, in full or part, in the counties specified above;
    b. Infestations that are within five (5) linear miles south of the Demarcation Line; and
    c. Property borders with state and county highways that generally traverse south-north from areas south of the Demarcation Line into the Eradication Zone.
4. Ownership size requirement: none
5. Maximum acres treated: The primary objective of the Stop The Spread program is to halt the spread of cogongrass to uninfested sites, including, but not limited to: Eradication zone, private properties, transportation systems, waterways, and rights-of way. The vast majority of participants qualifying for the Stop The Spread program will have cogongrass infestations that, in aggregate on the enrolled property, are of relatively small acreage. The Coordinator will make every effort to treat all cogongrass infestations on the enrolled property if qualified for the Stop The Spread program. There may be rare instances where the aggregate acreage of cogongrass infestations on an individual participant's property is at a level where treating all of the infestations would put an undue burden on the ability to treat other participants in the State Borders program. Therefore, in the Stop The Spread zone the maximum area that can be treated per landowner is set at 25 acres. The Coordinator has final authority, based on current knowledge, objectives, budget, and remaining financial resources available to this grant to modify this cap of treated acreage.
6. Enrollment open date: April 1, 2010

[4] More information can be found at http://www.nrcs.usda.gov/programs/SLB_Farmer
[5] US Highway 80 between the AL/GA state line and Montgomery and US Highway 82 between Montgomery and the AL/MS state line.

7. Enrollment close date: December 31, 2011 or until funding for enrolled Properties is exhausted. This will be determined by the money required to treat all known enrolled Infestations.
8. Percent allocated of total operational funding: 6.2%

Strategy 5. Endangered and Threatened Species or Habitats

1. Counties where active: All Alabama counties
2. Objective: This program is designed to afford financial support specifically allocated to sites where G1, G2 habitat is threatened by cogongrass. Information about global ranks can be acquired at www.alnhp.org or by calling Michael Barbour at (334) 844-5017. Supervision and labor will be provided by non-governmental organizations (NGOs).
3. Eligibility: This strategy has multiple requirements for eligibility, and all requirements must be met to be enrolled in this Strategy:
    a. Private non-industrial Landowners who own Property, in full or part, in any county of Alabama;
    b. Infestations share geographic area or are within 100 feet of a species or community documented by the Alabama Natural Heritage Program as having a Global Rank of G1 (critically imperiled globally) or G2 (imperiled globally).
4. Ownership size requirement: none
5. Maximum acres treated: until Strategy funding is exhausted
6. Enrollment open date: April 1, 2010
7. Enrollment close date: December 31, 2011 or until funding for enrolled Properties is exhausted. This will be determined by the money required to treat all known enrolled Infestations.
8. Percent allocated of total operational funding: 0.2%

Strategy 6. Selective Control and Mitigation

1. Counties where active: Autauga, Baldwin, Barbour, Bibb, Bullock, Butler, Chilton, Choctaw, Clarke, Coffee, Conecuh, Covington, Crenshaw, Dale, Dallas, Escambia, Geneva, Greene, Hale, Henry, Houston, Lee, Lowndes, Macon, Marengo, Mobile, Monroe, Montgomery, Perry, Pickens, Pike, Russell, Sumter, Tuscaloosa, Washington, Wilcox
2. Objective: This Strategy will be a mapping and chemical treatment program focused on southern Alabama Properties south of US Highway 80. Participants will have property mapped for cogongrass. Infestations of 10 acres or less will be treated with first priority along roads and boundaries.
3. Eligibility: This strategy has multiple requirements for eligibility, and all requirements must be met to be enrolled in this Strategy:
    a. Private non-industrial Landowners who own Property, in full or part, in the counties specified above and south of the Demarcation Line;
    b. Data provided by the Landowner will be used in an objective spatial analysis program to calculate a "grade" based on numerous factors. Landowners with a grade of 85 or above will be accepted as Participants. The analysis will be described in the subsection "Analysis" below.
4. Analysis: In order to have the most positive effect on an area of Alabama with tremendous amounts of Infestations the Coordinator is using custom analysis tools to calculate a grade for each Landowner. By doing this we maximize the impact that each Treatment has on a geographic area. Several factors go into the analysis, and each factor is weighted differently. The specific variables that will go into the analysis and subsequent grade will be published on our website by July 31, 2010. Landowners will be informed of selection in Fall 2010 or Winter 2011, and we will begin treatment in the 2011 spray season.
5. Ownership size requirement: none
6. Maximum acres treated: 10 acres of aggregate Infestations per Participant. The Program may stop enrolling Landowners in this Strategy before the close date when it is determined that funding will be exhausted for currently enrolled Participants.
7. Enrollment open date: April 1, 2010
8. Enrollment close date: December 31, 2011 or until funding for enrolled Properties is exhausted. This will be determined by the money required to treat all known enrolled Infestations.
9. Percent allocated of total operational funding: 50.3%

Application Procedure

1. The Landowner who meets the basic eligibility criteria can fill out the Enrollment Form and submit it to the Alabama Cogongrass Control Center. Contact details are at the end of this document. In the coming months the Landowner can also fill out the form online at our website by going to www.alabamacogongrass.com/enroll, creating a free account, and submitting the form there. This account will be used for the life of the program, and the Landowner can update their contact or Property information as well as check their status in the Program.
2. The Coordinator will review the information and enter it into a master GIS database. At that time the Landowner will be assigned a Participant ID that will be used to identify and track their information throughout the Program. If Property GIS polygons are available the Coordinator will use them in the master GIS database; otherwise plat maps and/or aerial imagery will be used to generate a general tract outline for the property.
3. The Coordinator will respond to the applicant and schedule a site visit as soon as convenient for both parties. Depending on the Landowner response for each county or region this may vary. This site visit is very important as several things will be determined: the verification and GPS documentation of at least one Infestation; the Treatment prescription for the Infestation(s); documentation of access for the Vendor; and other documentation as needed. Finally, the Access Agreement, a contract that states the Program is granted access to the Property and treat Infestations, must be signed by the Applicant. The Coordinator will keep the original version and provide a copy to the Participant.

4. The Scout will mark the boundaries of the Infestation with pink flagging that has the Program's logo and contact information.
5. The Scout will upload the Infestation data to the Coordinator who will verify data integrity and schedule Treatment based on the Prescription, access, and location.

Monitoring Procedure

1. Upon completion of the first Treatment there may be at least one site visit by the Scout to verify that the Infestations were treated by the Vendor and determine if any alterations should be made to the Prescription.
2. The Scout may sample the center of each Infestation with a shovel to measure the depth of the rhizome layer. This is important as eradication of that Infestation is only succeeded when all living rhizomes are gone.
3. An Auditor may also visit the Property to assess the efficacy of the Treatment or to check the Vendor as they are performing the actual Treatment.

Reporting Procedure

1. Because the Program is funded by an ARRA grant all data collected by this Program will be made available to the US federal or state of Alabama government. Some of this information may be used for public reporting.
2. Data collected for the purposes of Treatment, Monitoring, and auditing will be used by the Coordinator for reporting to AFC and the US Forest Service, who are responsible for overall administration of this Program. The Coordinator takes privacy very seriously and will never willingly publish, in publications or our website, any personally identifiable financial or contact information of Participants or Landowners.

Additional Infestations

1. The Vendor will be responsible for performing the Treatment as documented by the Scout and following Alabama Best Management Practices and accepted safety practices.
2. In the event that the Program cannot treat all Infestations on a Property, that Participant can enter into a separate agreement with the Vendor so that the remaining Infestations can be treated. <u>The Coordinator and Program will not be responsible for organizing, treating, and monitoring these Infestations</u>. It will be the Landowner's responsibility for contacting the Vendor.

Covenants

By signing the Enrollment Form the Applicant makes the following certification and agreements in favor of the AFC and the Coordinator:

1. You certify that you are the legal owner of the Property described on the application or their designated legal representative for making land management decisions.
2. You agree to allow to the Coordinator, Scout, Vendor, and Auditor free and unfettered access to the Property for the purposes of performing the Program duties as described in this document. These duties include verification, mapping, treatment, assessment, and monitoring of Infestations. You understand you will be contacted by these parties prior to any site visit.
3. You understand that, if any Infestations on the Property are treated by the Program, it will be for a set prescription that is determined by the Scout and conducted by the Vendor. This prescription will be outlined in a contract that you sign between you (the Landowner) and the Coordinator and valid for a set time period.
4. You further certify that participation by you or on your behalf in the Program is not fraudulent or otherwise illegal, that you qualify for the Program based on the Eligibility Requirements, and wish to apply for the Program.
5. You understand that this is a wholly voluntary program and can withdraw at any time as described in the Access Agreement.

Contact Information

The following is a list of all the possible ways to contact the Coordinator. This list is subject to change and will be updated on our website.

Internet: http://www.alabamacogongrass.com
Email: info@alabamacogongrass.com
Regular mail: Alabama Cogongrass Control Center c/o Larson & McGowin, P.O. 2143, Mobile, AL 36652
Phone: (334) 240-9348 is the cogongrass hotline at the AFC office in Montgomery; (251) 438-4581 is the Coordinator's home office in Mobile, AL
Fax: (251) 650-1600

ALABAMA COGONGRASS CONTROL CENTER

ENROLLMENT FORM PAGE 1

Instructions: send either to **ACCC c/o Larson & McGowin, P.O. Box 2143, Mobile, AL 36652, enroll@alabamacogongrass.com, or fax to 251-650-1600**. This program is open to private, nonindustrial landowners in Alabama, regardless of property size. For some strategies there is a maximum acreage treated. Details are on our website or upon request. The cogongrass hotline is 334-240-9348. Complete to the best of your knowledge. Note: for large acreages or properties spanning multiple counties please fill out additional forms. In this case you need not fill out every part of this form unless necessary (such as contact information, etc.). Simply specify you are submitting multiple forms for the property, and note which tract it is out of the total number of tracts (see below).

Have you enrolled another property in this program? ☐ YES ☐ NO | ☐ I am submitting multiple forms. This form is for tract _____ of _____.

CONTACT INFORMATION

Title (Mr., Mrs., Ms., Dr.)	Last Name	First Name	M.I.	Suffix (Jr., Sr., etc.)

Mailing Address	City	State	Zip

Email (if available)	Primary Contact Number	Alternate Number	Fax

Contact Preference: ☐ Email ☐ Mail ☐ Fax

How did you hear about us? ☐ Internet ☐ Newspaper ☐ Magazine ☐ TV/Radio ☐ Friend ☐ Family ☐ Consultant ☐ Gov't Agency ☐ Other (please describe)

SPECIFIC PROPERTY INFORMATION (USE ADDITIONAL FORMS FOR LARGE ACREAGES OR MULTIPLE COUNTIES)[1]

Property name*	Legal owner(s) (as on deed so we can confirm ownership)	Parcel number or ID (use page 2 or a new form to list more parcels)

Is there a non-owner who has legal authority for management decisions such as a consultant? ☐ Yes ☐ No	Are you the best person to contact for access? ☐ Yes ☐ No	Contact name for property access	Phone number for property access	Person responsible for land management ☐ Self ☐ Private consultant ☐ Other (describe)

Primary access route (such as a highway, county road, etc. This will greatly help when we first visit your property. More space on page 2.)

What access routes are there to the property? (check all that apply) ☐ Unrestricted ☐ Gate/unlocked ☐ Gate/locked ☐ Landlocked ☐ Through private property ☐ Other (describe)

County (one form for each county)	Nearest city	Section	Township	Range	Latitude*	Longitude*

Total property size (acres)	Do you own multiple Alabama properties, in full or part? ☐ Yes ☐ No	I have GIS/GPS boundary data available for:[2]* ☐ Property ☐ Cogongrass

Is your property located within 0.25 miles of the state border? ☐ Yes ☐ No
If yes, which state? ☐ AL/GA ☐ AL/FL ☐ AL/MS ☐ AL/TN

Have you participated in any cost-share programs for this property?[3] ☐ Yes ☐ No If yes, describe:

SPECIFIC COGONGRASS INFORMATION

Estimated *total* acreage of cogongrass	Do you have GPS coordinates of any cogongrass infestations?* ☐ All ☐ Some ☐ None	Do you have an active cogongrass treatment program? ☐ Yes ☐ No ☐ I used to	If yes, how many years has the program been active?

In general, where is the cogongrass located on the property? (check all that apply)
☐ Totally within my property ☐ On border with private landowner
☐ On border with public property ☐ Other

Do any infestations *share* a border with a:
-road? ☐ Yes ☐ No ☐ Don't know
-right-of-way? ☐ Yes ☐ No ☐ Don't know

What are the cover types where the cogongrass is actually located? (check any that apply)
☐ Water edge ☐ Residential yard ☐ Agricultural ☐ Pasture ☐ Fallow field ☐ Pine <20 ft. tall ☐ Pine >20 ft. tall ☐ Hardwoods present
☐ Utility right-of-way ☐ Road right-of-way ☐ Other (describe)

Is any cogongrass:
-Within 20 feet of hardwoods or special plants?[4] ☐ Yes ☐ No ☐ Don't know
-Near endangered/threatened species or habitats?[6] ☐ Yes ☐ No ☐ Don't know
-Adjacent to special or unique sites?[5] ☐ Yes ☐ No ☐ Don't know
-Other (describe on next page) ☐ Yes ☐ No

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[1] Only one property per landowner may be enrolled in this program. For large acreages or properties covering multiple counties please fill out additional forms.
[2] To best serve you we request any GIS or GPS information you may have. Some counties have parcel information available online.
[3] Answering "yes" does not exclude you from this program. However, specific areas enrolled cannot be currently enrolled in any government cost-share program for treating cogongrass.
[4] The herbicides used will be dependent on several factors, and we will avoid using imazapyr if there are any plants the landowner wishes to keep that may be injured or killed by this herbicide.
[5] Special sites would be those of historical, cultural, or personal significance.
[6] Species, habitats, or communities that are labeled as G1 (critically imperiled globally) or G2 (imperiled globally) by the Alabama Natural Heritage Program (www.alnhp.org).
*Optional or if known, otherwise leave blank.

ALABAMA COGONGRASS CONTROL CENTER

ENROLLMENT FORM – PAGE 2

FOR LANDOWNERS WITH LIVESTOCK

Areas treated with imazapyr should not be grazed for 30 days following treatment. If grazing cannot be prevented, livestock should not be sold for slaughter for 30 days. Areas treated with glyphosate should not be grazed for 7 days after treatment to allow for full absorption of chemicals. If livestock is present on property please indicate your willingness to follow these guidelines. ☐ **YES** ☐ **NO**

ADDITIONAL INFORMATION

Instructions: Use this section for adding any information about the property that can't be included in a checkbox or if you need more space. This will assist us in better serving you. This can include access routes, additional contact or property information, cogongrass history and treatments, etc. If you are adding information from a question on page 1, go to the last box below and note which question. Any information you can submit to us may be helpful as we determine the specific course of action for the cogongrass on your property, and we thank you in advance.

Access routes (such as preferred access routes for visiting, treating, or monitoring cogongrass infestations; specific routes for larger vehicles such as tractor trailers to take):

Additional contact details (other names, phone numbers, emails, best time to call, etc.):

Prior cogongrass management (such as date or year; how it was treated; herbicide type, amounts, and rates if known; treatment success, etc.):

Details on special sites (such as things we should look out for on homesites like special live oaks, cemeteries, gardens, etc.):

Please be aware of the following on the property (such as playgrounds, children, domestic animals, livestock, homesites, etc.):

Additional information from questions on page 1 (please refer to the question, then write what you need):

AGREEMENT

By signing this document I certify that I have answered the questions above to the best of my knowledge and read and agree to all program requirements and covenants listed in the back of this application. I affirm with my signature that I am not currently receiving government cost-share funds for cogongrass treatment on the areas I am submitting for possible acceptance into the program. I also give access rights to the Alabama Cogongrass Control Center and their representatives for visiting my property to validate and map any cogongrass infestations for treatment.

APPLICANT: **Signature:**_____ **Date:** _____ **Title:** _____

COORDINATOR: **Signature:**_____ **Date:** _____

OFFICE USE ONLY

Received: Click here to enter a date.	Strategy:	DB1: ☐ DB2: ☐ Val ☐ Enr ☐ Trt1 ☐ Ins1 ☐ Trt2 ☐ Ins2 ☐ Mon ☐ Com ☐