

FINAL REPORT

USDA Forest Service

International Programs

Technical Assistance Trip
Greater Virunga Landscape of Uganda and Rwanda
10 to 24 May, 2010

Issues, Findings, and Recommendations for:

- Developing a fire management planning process
- Understanding and communicating the Region's fire ecology
- Immediate steps for implementation

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List of Terms

Early burning - A fire deliberately set and managed before or at the onset of a dry season. The objective is to create an area that will not carry fire when an active wildfire is in progress later on.

Flapper (or beater) - Rectangular strip of rubber attached to a pole and used to beat out fires. A beater can be made of branches rather than rubber.

Prescribed fire - Fire deliberately set and managed to meet resource management objectives. Early burning is a form of prescribed burning.

Fire Management Zone - A mapped zone, determined by fire regime and by management objectives, that will have a characteristic fire behavior response and require characteristic fire management techniques.

List of Acronyms

CARPE	Central African Regional Program for the Environment
DRC	Democratic Republic of the Congo
FR	Forest Reserves
FMP	Fire management plan
FMZ	Fire Management Zone
GVL	Greater Virunga Landscape
GVTS	Greater Virunga Transboundary Secretariat
ICS	Incident command system
IP	International Programs office of the US Forest Service
ITFC	International Tropical Forest Center
MIST	Minimum impacts suppression tactics
NAFA	National Forest Authority (of Rwanda)
NFA	National Forest Authority (of Uganda)
NP	National Parks
NGO	Non-governmental organization
RDB	Rwanda Development Board (of Tourism and Conservation)
USFS	United States Forest Service
UWA	Uganda Wildlife Authority
WCS	Wildlife Conservation Society
WR	Wildlife Reserves

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Many people contributed to our successful trip and ultimately this report. Tom Sengalama, representing the Greater Virunga Transboundary Secretariat, and Jim Beck of US Forest Service International Programs, were instrumental in initiating discussions for the trip and then bringing it to fruition. Funding to support the trip was provided through the USAID Central Africa Regional Program for the Environment (CARPE). Richard Kapere, Senior Planner at the Uganda Wildlife Authority, and his driver Roland took excellent care of us through our mission in Uganda, surmounting one logistical hurdle after another. Tom Sengalama played the equivalent role on the Rwandan side.

We are of course also indebted to all the professionals who generously shared their time, thoughts, and information with us in many meetings and field trips over the course of our eight days in the field. Their names are recorded in the List of Contacts in the Appendix D.

Executive Summary

The ecosystems of the Greater Virunga Landscape of Uganda, Rwanda, and the Democratic Republic of the Congo form a heritage of some of the planet's most important biodiversity. Eastern mountain gorillas, the Region's signature wildlife species, have brought the world's attention to the importance and urgency of maintaining and enhancing the restoration and sustainability of these ecosystems.

To this end, the Greater Virunga Transboundary Secretariat is being formed to better coordinate resource management and restoration in the Landscape. Recognizing that wildfire management in the Landscape is a key component of this effort, the Secretariat requested assistance from the US Forest Service in how to development a fire management process and foster related activities.

A US Forest Service (USFS) technical assistance team visited the Uganda and Rwanda portions of the Landscape from 10 to 24 May, 2010. This report details their key findings and recommendations for action. The theme of the report is that a fire management planning process should be initiated under the auspices of the Secretariat, but that immediate steps can and should be implemented as the planning process unfolds. The team found that Uganda's Wildlife Authority and National Forest Authority are already taking constructive restoration actions that should be continued and supported, expanding them where appropriate. In Rwanda, the National Parks in the Virunga Landscape do not have significant savanna areas. Their managers are coping well with fire, but training and coordination may still be indicated. What follows are the key recommendations for moving forward:

1. Initiate a fire management planning process involving key partners and stakeholders for the Virunga Landscape. This report suggests details on how that might be constructed and developed at the landscape, national, and local levels. A strong emphasis on ownership by those who must guide and implement the work is critical; it should not be directed by outside advisors. Activities on the ground should not be delayed awaiting completion of the plan; they can be ongoing and inform the plan's development.

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2. The team consistently heard from the field that greater capacity in fire fighting (in both Uganda and Rwanda) and early burning (in Uganda) is needed.
3. There was also agreement with the field on a need for better understanding and communication of the fire ecology of the Region. A clear understanding of how today's fires compare with an ecologically appropriate level of fire frequency and severity needs to be communicated at all levels and fundamentally built into both planning and operational processes.
4. We also heard a clear message that all of Uganda's National Parks were in need of fire management attention, not only those in the Greater Virunga Landscape. Although this was outside the scope of our task, we believe this concern is valid and merits follow-up. Our proposal in the report for national fire management plans is in part driven by this concern.

USFS International Programs is well placed to potentially assist in meeting these needs as follows:

1. The USFS could provide training on the fire management planning process, provide advice, and facilitating meetings where appropriate. This training is needed at both national and local unit levels, and in assisting the GVTs in drafting fire management planning guidance for the nations signing the transboundary agreement.
2. For on-the-ground training in specific aspects of fire fighting and management, the team recommends a USFS expert with experience in early burning and wildland fire fighting be sent during the upcoming dry season in January 2011 for a 2-3 month period to mentor local professionals in these techniques.

In addition to this mentoring period, targeted trainings on specific aspects of fire fighting, such as using an incident command system (ICS) or using weather information could be contributed by the USFS. These targeted trainings could be conducted during a 2-3 week visit by a small team.

3. Training by the USFS in applied fire ecology could be conducted as part of the 2-3 week visits mentioned in above. A good partner in this effort would be the Wildlife Conservation Society, because of their considerable experience and expertise in the region.

1.0 Introduction

1.1 Description of the Landscape

The Greater Virunga landscape constitutes the central part of the Albertine rift. The Landscape classified as the Albertine Rift covers an area of 313,000km² in the six countries of Uganda, DRC, Rwanda, Burundi, Tanzania and Zambia. The Albertine Rift and the Greater Virunga Landscape constitutes the richest ecosystem in Africa in terms of species richness, diversity, and

endemism. It represents a unique world heritage containing high biological diversity, with about 43 percent of Africa's bird species, 27 percent of Africa's mammals, and at least 414 endemic species of plants and animals. Of these, 96 are threatened species. Endangered species include the last remaining wild mountain gorilla populations on earth. The landscape has a mosaic of high rain forests, montane forest, and savannah grasslands. This provides not only a wide range of habitats and diversity, but also a wide range of land use options and challenges.

While this landscape represents a unique world conservation heritage, it at the same time faces very serious conservation and development challenges, mainly due to high population growth (2-4% per year) and severe poverty levels. In Rwanda and southwestern Uganda, essentially any land not in reserve status has been directly altered by agriculture or tree plantations. The landscape mosaic provides other unique challenges as well. Much of the tropical high forest and the montane forest is consistently moist and and less prone to fire. In contrast, the savanna grassland is highly flammable. It is in this savanna that more than 90% of large ungulates and carnivores reside. In the past, the management processes in the landscape emphasized control of illegal activities and poaching with little emphasis on comprehensive fire management strategies.

Given that fire can negatively affect the ecosystem if not properly managed, there is a great need to develop a comprehensive strategy that will respond to the fire management challenges. Fires are now nearly all human-caused, leading in some cases to more fires than in the past. Where landscapes were once burned at fairly long intervals, some areas are burning multiple times within a 10-year-period, arresting succession and degrading the ecosystem. The human set fire which is either accidental or malicious can be a great risk to the Albertine rift biodiversity. Examples are the July 2009 fire in higher-elevation montane forest in Volcanoes and Mgahinga National Parks, and a period of repeated burning in part of Nyungwe National park from 2000-2005.

The Greater Virunga Landscape has diverse vegetation types with varied levels of vulnerability to fire. It is very important to use these differences in ecosystems to plan properly for fire management. Some areas of the montane forest at higher elevation should probably always be protected from fire. In contrast, savanna grassland includes burning (and fairly often) as part of the way it functions properly.

Unfortunately, the protected area authorities currently do not have clearly developed strategies for combating fires. The Greater Virunga Transboundary Secretariat has discussed this problem with the protected area authorities in Uganda, Rwanda and DRC and agreed to come up with a Transboundary fire management plan and also coordinate regional capacity building for effective management of forest fires.

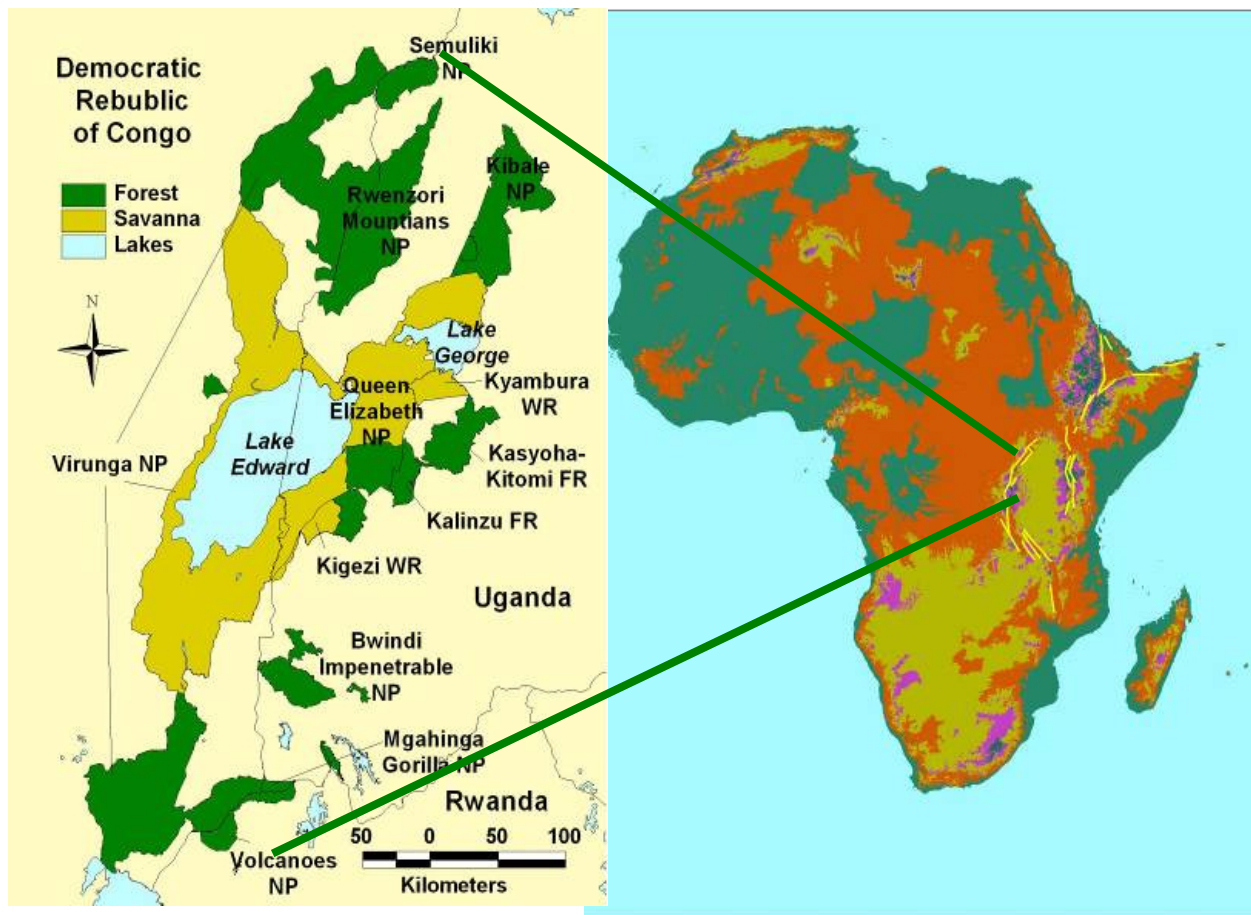


Figure 1. Greater Virunga Landscape (GVL) and its location in East Africa, showing National Parks (NP), Wildlife Reserves (WR), and Forest Reserves (FR). During the trip the authors visited Kibale, Queen Elizabeth, and Bwindi Impenetrable National Parks in Uganda, and Volcanoes and Nyungwe (not pictured) National Parks in Rwanda. Nyungwe NP is south of Volcanoes NP on the map. Map provided by the GVTs.

2.0 Purpose and objectives

The objective for the trip was to gather as much information as practical on the key needs of the Greater Virunga Transboundary Landscape for fire management planning, building fire fighting and early burning capacity, and using a better understanding of the area's fire ecology to shape planning decisions. We were then tasked with using this to develop guidelines for implementing a fire management planning process. We also develop a set of specific recommendations for immediate implementation. The scope of work, itinerary, and people/institutions contacted for this mission can be found in Appendices A, B, and C, respectively.

3.0 Issues and findings

3.1 Understanding and communicating fire ecology and its implications

Understanding fire ecology is a primary consideration in developing and implementing any fire management planning process. Land capability, including climate, drives the types and sizes of fires possible.

Considerable literature exists on the fire ecology of the Albertine rift, particularly on Queen Elizabeth National Park (Jaksic-Born 2004c). We have drawn on this in developing our report.

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We note that while considerable research is being done, little is being conveyed to the field. We consistently heard an interest in learning more on fire ecology and the practical applications for field work in the parks while in Uganda.

Fire ecology begins with an understanding of the fire regime for an area, i.e., the combination of fire frequency and severity over time. For example, a montane rainforest without significant human alteration (i.e., agriculture) would have a low fire frequency (long interval between fires, if ever) and a low severity when fires do occur (slow, creeping ground fire). In contrast, a savanna grassland would have both high frequency (almost yearly) and severity (nearly all grass consumed) of fires.

From our discussions with field personnel, information provided by the Uganda Wildlife Authority, and limited literature review, we see three basic fire regimes in the areas we visited (Table 1).

Table 1. Fire regimes without human influence, Albertine Rift area of Uganda and Rwanda. Risk here is defined simply as the probability of a fire event.

Fire Frequency	Fire Severity	Vegetation Type(s)	Risk of Fire Event
Low	Low	Montane rain forest	Low
High	High	Grassland and Savanna (scattered trees)	High
Moderate to high	Moderate	Savanna woodland	Medium

Because the Albertine Rift area has been heavily affected by human settlement, however, fire regimes can become altered. Following is an approximation of the current situation (Table 2).

Table 2. Fire regimes with human influence, Albertine Rift area of Uganda and Rwanda. Risk here is defined simply as the probability of a fire event.

Fire Frequency	Fire Severity	Vegetation Type(s)	Risk of Fire Event
Moderate	Low	Montane rain forest	Moderate
High	High	Grassland and Savanna (scattered trees)	High
Moderate to high	Moderate to high	Savanna Woodland	Medium
Low	High	Tree Plantation	Medium

Fire ecology informs but does not dictate fire management planning. Knowledge of how fire regimes operate in different landscapes helps us understand what is possible on landscapes. Equipped with this understanding, we can make plans that are more likely to succeed, and where the costs are clearly understood. For example, excluding fire from montane rain forest is easier than excluding it from savanna grassland, because the latter is much more prone to fires getting starting and expanding, regardless of human settlement.

Fire regimes can be used to define zones where different fire management practices are employed. This concept is being used in the fire management plans under development for each national park in Uganda, where the risk of a fire event (probability of a fire occurring) is used to define the zones.

Fire management of the vegetation types (risk zones) described in Tables 1 and 2 will be influenced by factors altering their ecology. Namely, we understood that there are five key issues or threats related to fire that should be considered in managing the Landscape, including: excessive grazing, speargrass invasion, agricultural impacts, hunting, and malicious ignitions.

3.1.1 Excessive Grazing

During our discussions with UWA staff at Queen Elizabeth National Park, we learned that one of their top concerns is excessive grazing from livestock on the park fringes. This grazing is likely to be a factor in the expansion of speargrass (*Imperata cylindrica*), an undesirable invasive species considered one of the world's 10 worst weeds, occurring in 73 countries as a pest on a total of 35 crops. (See http://www.fleppc.org/ID_book/Imperata%20cylindrica.pdf)

3.1.2 Speargrass Invasion

Speargrass was also consistently stated as a concern among UWA staff. This invasive is fire resistant; tops are killed but the plant quickly resprouts from rhizomes. It was observed in a number of areas in Queen Elizabeth National Park, and probably affects all the savanna parks in Uganda. It is not generally a concern in the higher elevation montane rainforest zone.

Frequent burning favors speargrass expansion. The recommended control in agricultural lands is an integrated management approach using deep tilling following burning. (See <http://www.issg.org/database/species/ecology.asp?fr=1&si=16>). In a park management context, trying to exclude these areas from burning, coupled with hand pulling and digging may be the best option.



Figure 2. Speargrass expansion from a roadside in Queen Elizabeth National Park, Uganda. (It is the darker green grass with wider leaves.)

3.1.3 Agricultural Impacts

Fire risk can be aggravated by the use of fire to clear agricultural plots for planting if these plots are adjacent to parks or other protected areas, and if the fire escapes into the reserve.

3.1.4 Hunting and Gathering

Hunters sometimes start fires, either to drive game out, making them easier to kill, or accidentally through their campfires. We include poachers in this category. Honey gatherers, who use smoke in the honey collection process, are another common source of accidentally caused fires.

3.1.5 Malicious Ignitions

Sometimes people start fires with intent of deliberately destroying the forest, because of disputes about land use, or because of arson, which can have many causes. Developing good relationships with surrounding villages, coupled with an effective fire prevention campaign, is the best way to address this issue.

All the above issues should be considered in developing fire management plans, since they will shape the realistic framework of both what is needed, and also what is possible.

3.2 Developing a fire management planning process at the Landscape, national, and local levels

As we met with a variety of officials from government agencies and their NGO partners at multiple levels, we began to see a need for coordination in fire management activities. Park wardens were often doing a very good job with the resources available to them, but were not always aware of activities in other parks or how they could help each other. We saw the need for fire management planning at the national and local unit levels with some overall coordination and guidance at the Landscape level.

Moreover, as often happens in natural resource management, the science base is scattered and incomplete. In this report we have tried to pull together and synthesize as much of the information available as possible, and present it in a useful and practical form. Much remains to be understood about the fire ecology of the region, but we advise moving forward and taking action rather than waiting years for additional research results. As research findings become available they can be incorporated into planning in an adaptive management process.

In Uganda, we found the UWA is developing fire management plans for its protected areas. Their document, “Guidelines for Developing Fire Management Plans for the Protected Areas” outlines direction on categorizing areas into risk zones, strategies for early burning and wildfire suppression, and guidance on tactical aspects of fire fighting. The document provides a fire management plan format. We have included this as Appendix D, and annotated it to suggest additions and changes to strengthen the plan format. Draft fire management plans, following this format, have been prepared for Mgahinga National Park, Kidepo Valley Conservation Area, and Murchison Falls National Park. Copies of these are on file and available from the USFS team (specifically DeMeo). We also were given a copy of the Semuliki National Park general management plan, which has a short section on fire management (detailing recommended fire management actions and responsibilities).

A variety of planning processes and tools have been developed that can further inform the development of a planning process in the Greater Virunga Landscape. The USFS/CARPE program has produced land use planning guides for the central Africa region (<http://carpe.umd.edu/Plone/resources/carpemgmttools>) and may very well be applicable to other regions in Africa and beyond.

In the planning process, a set of desired conditions are identified through a collaborative process, following by identification of clear objectives to achieve the desired conditions. Methods and means are then identified to meet the objectives. Finally, there must be clearly identified responsibilities and a monitoring process to ensure the objectives are being met. Additionally, in a planning process, if you want to conserve a species or landscape – which can be referred to as conservation “targets” – you need to first know the current health (or viability) of those targets. The next step is to identify the main stresses to those targets (and their proximate causes, or “threats”), and ultimately the planning process guides planning teams in developing strategies that either improve the health of the targets or abate the critical threats that face them.

An important element of the planning process is that it is an iterative – or adaptable – approach to conservation, which emphasizes the importance not only of implementing strategies but of measuring their effectiveness and improving them over time to ensure that they achieve the intended results (Jane Goodall Institute 2007).

We stress that the planning process be led and facilitated by the government agencies of the respective countries involved. This will assure the best ownership of the process by those who must implement it.

As we met with multiple managers at different levels of government, it was felt that fire management planning may need to take place on more than one level. Although the assignment was specifically to assist the GVTs in fire management planning, it is thought that to be most effective planning should also be furthered at the program or national level for each country. There is some fire management planning occurring within some agencies throughout the countries. This report makes recommendations that may further and expand these efforts. Throughout the report fire management planning will be discussed as being at either national level or local level.

3.3 Building capacity in understanding fire ecology, improving early burning, and fighting wildfire

Capacity consists of human/technical, material, financial, and institutional resources. Following are our observations on each of these categories and their roles in fire management.

3.3.1 Human/technical

Those we spoke with appeared dedicated and motivated to the task of fire management. It also did not appear the number of personnel was an issue in fighting fires or conducting early burning. Rather there appeared to be needs in two key areas: training and coordination. Training in the topics of fire ecology, behavior, weather, prevention, and specific early burning and wildland firefighting techniques will be useful. In regards to coordination, agreement on and adoption of an incident coordination system is critical and lacking at present.

As for understanding fire ecology, although much literature is available on fire ecology for the Landscape (particularly for Queen Elizabeth National Park) (Eltringham 1976, Higgins et al. 2000, Jaksic-Born 2004a, Jaksic-Born 2004b, Olupot et al. 2009, Plumptre et al. 2007, Jaksic-Born, 2004c) it has not been communicated well or used effectively in fire management activities or planning. For example, the speargrass (*Imperata cylindrica*) invasion problem at Queen Elizabeth National Park was thoroughly discussed with park officials. Their concern for this invasive, which displaces native, more palatable grasses, was well directed, but they seemed unaware of the considerable literature available on it, or how they might use this literature to improve their early burning and wildfire fighting tactics on the ground.

3.3.2 Material

We consistently found park fire managers understood their challenges well, and were using early burning (where appropriate) and fire fighting to the best of their available resources. We also heard calls for additional equipment. Broadly speaking we resist advocating for this, for often fire management involves strategies that depend less on equipment than on strategic use of personnel resources and knowledge of fire ecology, weather, and behavior. Moreover, for more expensive equipment such as pumper trucks, the countries involved will find it difficult to purchase and maintain these over time, as they require frequent complicated maintenance requiring significant financial and personnel resources. Nevertheless, certain basic equipment for field interventions is warranted.¹

3.3.3 Financial

Budgets will need to be reviewed and updated to fit whatever fire management plans are agreed on, including the process of creating the plans. Our observation is that the countries involved already do this, but may need to add funding to cover the planning process.

3.3.4 Institutional

The Greater Virunga Transboundary Secretariat agreement on fire management planning, once in place, should direct the member nations to develop national fire plans, including provisions for cooperation on transboundary fires. Cooperation between the countries has already yielded fruit and most specifically on gorilla conservation is encouraging, as gorilla populations are increasing over the past 25 years, despite civil wars (Plumptre et al. 2007). USFS International Programs, working with key regional, national, and local partners in Uganda, Rwanda, and DRC could play a significant and useful role in facilitating the development of landscape guidance and national and unit plans (see section 4.2).

4.0 Recommended Next Steps

4.1 Understanding and applying fire ecology

See Section 4.3 below on building capacity for how we recommend fire ecology can be better communicated.

¹ Shovels and flappers are the key field level equipment that could be used. The materials for making flappers do exist in the region, but some advice could be provided to build them. Indeed some flappers (beaters) already exist in the region, but by making more they would eliminate the need for cutting additional branches in firefighting efforts.

4.2 Implementing a fire management planning process

We see three levels of planning unfolding: at the multinational Greater Virunga Landscape level, at the national level, and at the local level.

4.2.1 Greater Virunga Landscape (GVL) Fire Management Planning Process

At the Landscape level, a fire management plan is really an agreement on how the member nations will proceed. The desired outcome is an international agreement on the GVL as a single ecological entity, agrees to fight fires that cross borders in a cooperative manner, and direction to the individual nations (Uganda and Rwanda, but perhaps DRC eventually) to develop national fire plans. As this agreement matures through time, an organization in the spirit of a fire protection compact could develop which could facilitate this process helping to coordinate international cooperation to share resources, knowledge and collaborate on training.

4.2.2 National Level Fire Management Planning

We recognized the need for national level fire management planning based on questions and concerns from several of the managers during discussions. We also heard a concern that Parks outside the GVL, some of them with more pressing fire concerns than some GVL parks, might be neglected. These concerns could best be addressed through a comprehensive, multi-agency plan at the national level benefitting from input of NGOs and other civil society actors. The plan would guide fire management policy and coordination. Consistency in local level fire management planning can be achieved by tiering to the national plan. It would ultimately be each agency's decision as they work together in what items need to be included. In addition to including goals of each agency, this plan could include any direction that the national level planners would like to convey to each unit. We recommend a document that addresses the following three topics: Interagency coordination, fire management capacity and needs, and local fire management plans.

Interagency coordination

Explain how various governmental and non-governmental organizations can work together to implement local level fire management plans. An example would be explaining how and when the army or local police may be used to assist in fire management. It may also explain how the NFA and UWA could work together during training or fire management, especially when in close proximity. Standardization of fire management procedures may also be appropriate in this category. Examples could include common terminology or common ways for reporting and tracking fires. This could be an opportunity to define who has unique roles, authorities and responsibilities in fire management and at what level of government different authorities exist.

Identify Fire Management Capacity and Needs

By understanding what each unit has for capacity, the capability of sharing resources increases. By the same measure, identifying needs at local levels will show strengths and weaknesses. This section can be achieved by consolidating information from local level plans. It could serve as a financial request mechanism if fire management needs are identified. This part of the plan could also serve as a means to track and schedule training throughout the nation increasing coordination and consistency.

Direct Local Fire Management Plans

The national plan can offer assistance in the development of unit level fire planning. Overarching goals for the management of fires throughout the nation should come from a national level. A template for local fire management plans and a schedule of review can be included in the national plan.

4.2.3 Local Planning Process

To improve existing Fire Management Plans and to create new plans, a similar planning process across each nation may be useful. A plan should be developed for any land management unit (park, reserve, conservation area or pertinent extractive zone) that manages land. If each unit has the same template or outline, it will be easy to review the plan of another unit and to quickly access the information. The GVL tri-nation cooperative agreement on fire and national fire plans and policies will provide a framework that local unit fire management plans can tier to. Plans can be written by the field expert for fire management on each unit and approved by the highest level of authority on each unit (example: Park Supervisor). It is critical that the local villages, interested NGOs, and other governmental agencies (notably the forest authorities) be involved in the development of the plan. If not engaged, these key stakeholders may be indifferent or hostile to the plan.

Updated as needed to reflect adaptive management as each element of the plan is put into practice, the local management plans should be reviewed by Transboundary staff to ensure desired consistency and facilitate the dissemination of ideas. Fire Management Staff can share their plans with nearby units and discuss improvements and changes--what works and what doesn't-- to help strengthen their own plans. Each unit will have a unique plan that addresses the issues for their unit, but will find some commonality with other units across the country and the Landscape.

4.2.4 Recommended Components of a Unit Fire Management Plan

Following is an outline of elements to consider including in a fire management plan for each land management unit. Each item can be considered a section of the plan and the extent as to which each is addressed, if at all, will depend on the need for that element on each individual unit. The importance of certain sections may differ depending on the unit. The local level fire plans should not conflict with any policies or directions that are already decided in the general Management Plans for a given area that may or may not exist. The Fire Management Plan can be a separate document and references can be made both to the larger level plan on each unit and to the national fire management plan.

Fire Management Zones

Several fire managers mentioned “zoning” their land base according to fire management strategies, based on fire regimes (fire frequency and severity based on vegetation type). This is an excellent planning tool in fire management and we recommend using zones. As a starting point for planning, each unit can make assessments of the vegetation type, the fire regimes and the desired response to fire for each Fire Management Zone (FMZ). The zones can be shared by more than one unit, or can be unique to one unit. It is possible that the FMZs could be derived from existing management zones if these zones relate to fire management. Each FMZ should outline specific direction on a) fire suppression response and b) early burning. Within each zone the reasons for each management strategy should be appropriate for the fire regime, and relate to the desired future condition of the zone.

Examples:

Zone A: Montane Forest types (as in Kibale, Bwindi, Mgahinga, Volcanoes, and Nyungwe National Parks), the desired condition is the existing condition of forest, no early burning will be used and fire exclusion should take place for all human caused fires. If a natural fire ignites, fire will be monitored to determine the risk to values if fire is not suppressed.

Zone B: Savannah (exists in Queen Elizabeth and Kibale National Parks). The desired condition is existing savannah. Early burning will be considered to maintain or create savannah. If a non management ignited fire starts in this FMZ, suppression efforts will be focused on the safety of the people and the spread of the fire to outside this FMZ.

Each zone has geographic boundaries. It will be important to have this map when a fire ignites to determine response.

Strategy

Fires can be suppressed with consideration to risks and values. It will be important to assess what these are for each unit and within each FMZ.

Values

A value in this case is anything that managers do not want to see burn. Some values may have greater weight than others. Examples of values include mature timber in a plantation, communication towers, community or private gardens, and gorilla habitat. Once values are identified, the priorities for suppressing the fire can be directed toward protecting those values. Values can be very closely tied to the ecology of each FMZ.

Risks

The risk of a fire is determined by the likelihood of a fire starting and spreading.

Example: During drought conditions, risk is high near the roads and boundaries where people have access to the reserve land.

Decisions on the strategy to fight the fire come from understanding the values and risk within each FMZ. Once the values and the risk are determined for each zone, the suppression strategy can be decided before the fire occurs. The risk and values of each zone can also help determine priority treatments for early burning.

Example: If a fire is burning on a fire exclusion FMZ, and it is the rainy season and the only value at risk is the forest, which is burning very slowly, then the fire could be monitored for a day before sending in firefighting resources.

When a fire is burning, managers can devise a strategy based on value and risk. While tactical decisions are often made at the site of the fire by the people fighting the wildfire, bigger picture strategic decisions can be made from the Park staff prior to the incident in the FMP. If each response is pre-planned, then at the start of the fire, the Park staff can determine what FMZ the fire is in and how it should be managed according to the plan. Since every possible scenario cannot be anticipated, decision making at the time of the incident should be conducted by a Park staff person who is familiar with the goals of the fire management program.

Weather

Understanding weather conditions can assist in management strategies during a fire. Fire behavior is often tied heavily to the current weather conditions. The expected weather often determines expected behavior and can guide tactics. Weather is also a crucial factor in early burning success to minimize chance of escape while maximizing benefits.

Weather can also help in the development of a fire danger rating system which can predict times of high fire danger when prevention and detection efforts can be increased. The following steps can be used to develop a fire danger system to be used in fire management. The fire management plan may outline how to accomplish each step.

- Identify existing weather stations (may or may not be government stations) and facilitate a communication strategy for compiling these data and sharing across the boundaries of units and countries.
- Identify gaps where there is no weather data and research possible funding opportunities. Consider maintenance costs of each unit.
- Use weather data to determine risk and develop a fire danger rating system (with help from the recommended mentor on 2-3 month assignment; see Section 4.3). Use the fire danger rating and the weather data to assist in planning prevention, detection, and early burning activities. In case of a wildfire, use the data to monitor fire behavior and keep weather data to use as a tool to improve wildfire strategies and research.

Prevention

Preventing human caused fires could greatly minimize the issue in this Landscape. While it may seem impossible to prevent every human caused wildfire, prevention can make a difference in the amount of effort that is needed for suppression. While many prevention programs already exist and may be working, a coordinated and increased effort may be effective. Monitoring the success of prevention is difficult and can be discouraging, but over time, the efforts can be worthwhile.

The fire danger rating system is one way to focus prevention and education activities. If people know when the fire danger is great, they can avoid certain activities on those days rather than trying to get the public to avoid the activity altogether, which can take time to accomplish.

Additional training in identifying the cause of fires can help determine the needs for education and prevention. Fire investigation classes can be administered to key personnel. Law enforcement can be a key element in preventing future fires, whether malicious or accidental.

Coordination

Further addressed in the capacity building section, the organization at an incident can be explained in the Fire Management Plan with roles identified. The FMP contains a plan for the organizational structure that will ensue in case of a suppression activity, and the various roles filled by individuals as they are available when the incident occurs.

Finance

USFS Trip Report - Fire Management and Planning in the Greater Virunga Landscape

Fire management certainly has associated costs, both for suppression and early burning (planning, equipment, and staff time during the fire or burn). The firefighting activity may have the extra cost of providing enticements for the community (e.g., small compensation for the public to motivate them to help fight the fires).

It appears that members of the public have varying levels of involvement, and consistent, pre-planned reimbursement (perhaps if possible always providing food and water for the community recruited firefighters) can relieve the manager of a stressful decision and can prepare the community for the firefighting efforts. Additionally, education on the importance of the suppression efforts may provide for more consistent and timely involvement from the community.

Budgeting for the fire management program is an essential piece of the planning process. Consideration for what will be needed in a bad fire season or a strong control burn season can be anticipated. When budgeting, planning costs should also be considered.

Detection

Finding and suppressing fires early on can minimize firefighting efforts, area burned, and sometimes, severity of the fire. Detection efforts can be focused on areas that are at the highest risk during weather conditions that present the highest risk, nearest to the greatest values. Fire towers and staff patrols are common and effective detection systems. In addition, communicating detection is critical. There should be a mechanism for the public to report smoke to the officials.

Example: Fire towers can be erected overlooking areas of greatest value and can be staffed on the days when fire danger is highest according to weather conditions and human activity (perhaps during honey hunting season).

Minimum Impact Suppression Tactics

Minimum Impact Suppression Tactics (MIST) can be identified in the FMP and used to protect fragile areas of the reserves. Once these tactics are identified, the pre-planning will assist the ground staff in making tactical decisions that consider impact to the land while effectively stopping the fire.

Example 1: Firelines can be limited to the width necessary to stop the fire. Using the appropriate tool for the landscape can minimize negative impacts.

Certain standards can be set for each FMZ which further describe desired activities within the park during times of suppression.

Example 2: In FMZ A, no mechanical equipment can be used without the approval of the Park Supervisor.

Example 3: In FMZ B, hand tools must be provided to firefighters to avoid the cutting of branches in order to fight the fires. This may be overruled by the Park Supervisor in the case of extreme urgency.

4.2.5 Suggested Planning Timeline

The following reflects the two levels of planning that are recommended: administrative (multinational GVTS agreements and national plans) and operational (local park or forest plans).

Administrative:

- June, July, August, September, October 2010 – GVTS, government officials, and NGOs work together to identify stakeholders, representatives, and lead agencies for the fire management planning process.
- November, December 2010 – Fire management planning process begins at the GVTS, national, and local levels. **We recommend that USFS assists GVTS in facilitating this process.**
- May 2011 – Draft fire management plans at each level are completed and submitted for appropriate reviews. **We recommend that the USFS support the review of fire management plans.**
- October 2011 - Revision process of fire management plans take place on each level.
- January 2012 - Final approvals of the fire management plans are facilitated by the GVTS. The facilitation process can then be handed off to an appropriate governmental agency or compact.

Operational:

- March, April, May 2011– National fire planning leads produce direction to the national parks and forests in their respective forests on developing individual park/forest plans. These leads then convene planning sessions as needed.
- November, December 2011– Following the fire season, parks/forests complete their plans and submit for approval.

4.3 Capacity building in early burning/fire fighting techniques, fire ecology, fire behavior, and fire weather

In this section we outline the categories of training needed to build fire fighting and management capacity, and then present a timeline to implement this training strategy.

4.3.1 Mentor on the Ground: 2-3 Month Assignment

The need for mentoring was mentioned during several discussions. The concept would be to have a USFS mentor experienced in fire management able to assist in practical scenarios. The mentor most likely would not spend much time assisting in fire management planning (described in section 4.2) as they would focus on actual fire management implementation. It would allow for on the job training to take place during early burning and wild fire season. The mentor would spend time with local managers at key locations throughout the area. The mentor could guide tactics and strategies during fire management. When fires are not occurring, additional training could be conducted. The specific aspects of this training are detailed in Section 4.3.2 that follows. This mentor will also help reinforce fire management training that has occurred in the past.

4.3.2 Developing a Fire Management Training Academy (Center of Excellence)

Depending on whether sufficient funding can be identified, we recommend the mentoring assignment be coupled with another, related effort to explore the need and feasibility of

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establishing a fire academy or center of excellence that would elevate the importance of training, and over time develop credibility and status as a desirable and necessary part of career development for natural resource professionals. A separate, small team of USFS personnel could further explore this concept and build capacity in the meanwhile through short assignments, working closely with host country personnel.

An initial effort of the training academy would be training in key fire management topics, i.e., fire fighting, fire weather, fire ecology, and fire prevention concepts. The target audience for this operational training would be managers such as wardens and rangers. The training would then provide them with the necessary information to train others in basic firefighting. We suggest a four-day training that is repeated a number of times in key locations in Uganda and Rwanda. An outline of a possible training is included as Appendix E1 to this report. The training should include practical field exercises as well as classroom teaching. The training would ideally occur before early burning season begins, yet at a time when burning could safely occur in order to practice fire management techniques.

Additional training for upper level managers could also take place. This would be a two-day training in the capitals on some of the basics of fire and bringing what is learned in fire management training into the fire management planning process. This would be targeted at lead fire management planners at national wildlife agencies, and their counterparts in NGOs and the GVTs. This could help ensure that the planners and government officials are able to communicate fire management with their field staffs. An example outline of this training is included as Appendix E2 to this report.

The training and fire management planning process is all time sensitive; however the commitments of field staff during the dry seasons may limit when training and planning can take place. A suggested timeline is included below:

- November, December 2010 – Training is conducted for upper level managers and field managers. This would allow wardens, rangers, and forest managers time to then train their firefighters with the knowledge and skills they have gained before the start of early burning season.
- January, February 2011 – A mentor arrives and assists with early burning and fire management. This enforces and enhances the training received in the last few months. Also gives local managers a chance to apply learned techniques with someone to assist.
- June, July, August 2011 – There may be more opportunities in this time period for mentoring as requested and needed based on the previous dry season experiences.
- September, October 2011 – Additional local level fire training could occur as needed.

During the time when a USFS fire management mentor is on the ground in Uganda, we recommend a two-person team join him/her to provide training in fire fighting, fire weather, fire ecology, and fire prevention concepts. The field training would be targeted at the level of park wardens and park fire management officers. These personnel could then follow up and train their early burning and fire-fighting crews in a “train the trainers” concept.

The field training would be a four-day event, including a practical field day. Depending on training resources and time available, it could be repeated.

The administrative training is a two-day event, essentially a condensed version of the field version, but also including how the concepts are implemented in the fire management planning process. This would be targeted at lead fire management planners at national wildlife agencies, and their counterparts in NGOs and the GVTs.

5.0 Additional Considerations

5.1 Considerations Specific to Uganda

For the Greater Virunga Landscape (GVL), Uganda must work with the complex problems facing savanna ecosystems, specifically the need for early burning, and dealing with speargrass invasion and excessive grazing. Within other ecosystems of the GVL these problems are much less prominent. For these reasons we recommend the person on the 2-3 month mentoring assignment be based at Queen Elizabeth (with option to travel to other parks if appropriate).

5.2 Considerations Specific to Rwanda

Rwanda appears to be facing fire management issues in its parks in the GVL (Volcanoes and Nyungwe) well, in part because these are not savanna parks, and thus fire issues are less complicated. Since these parks do not have significant savanna grassland, and occur at higher elevations, early burning programs are not appropriate. Volcanoes National Park uses buffer zones to protect the park. At Nyungwe, maintained firebreaks on the park boundaries also do not appear to be necessary, because of the rugged terrain and relative lack of fires. That said, previously mentioned support to planning at the various levels in Rwanda should be supported and explored as well as further focused scoping of any Rwanda specific fire management needs.

5.3 Fire Management in the Virunga Portion of the DRC

Finally, we recommend in the future that resource staff from Virunga National Park in the DRC interact with their counterparts in Uganda and Rwanda in shaping fire management planning for the Greater Virunga Landscape. Their involvement will be important to its success. Previously mentioned support to planning at the various levels in DRC should be supported and explored as well as further focused scoping of and DRC specific fire management needs.

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Appendix A. Scope of Work

Draft - USFS Team Scope of Work



US Forest Service International Programs



Development of a Transboundary Fire Management Plan for the Greater Virunga Landscape

May 2010

1. Introduction and Background

USFS-IP in Central Africa

The USDA Forest Service (USFS), through the Office of International Programs, is an implementing partner in the US Agency for International Development's (USAID) Central African Regional Program for the Environment (CARPE), providing targeted technical and capacity building assistance aimed at improving forest management in the Congo Basin. In an effort to focus this assistance in a manner which capitalizes on the relative strengths of the agency, the USFS is concentrating their efforts towards the land management planning processes of the CARPE landscapes. These landscapes were chosen for their biodiversity and conservation importance and established as foundations of regional conservation and sustainable natural resource use. These areas contain a mix of national parks and other protected areas, current or future timber and mining concessions, villages and settlements, and the neighboring areas on which communities depend for their day-to-day resources.

Fire management planning in the Greater Virunga landscape

The Greater Virunga landscape constitutes the central part of the Albertine rift. The region classified as the Albertine Rift covers an area of 313,000km² in six countries of Uganda, DRC, Rwanda, Burundi, Tanzania and Zambia. This described area of the Albertine Rift and the Greater Virunga Landscape constitutes the richest ecosystem in terms of species richness, diversity and endemism in Africa. It represents a unique world heritage containing high biological diversity, with about 43 percent of Africa's bird species, 27 percent of Africa's mammals, at least 414 endemic species of plants and animals of which 96 are threatened species and has endangered species including the last remaining wild mountain gorilla populations on earth. The landscape has a mosaic of high rain forests, afro-montane vegetation and savannah grasslands. This does not only provide a wide range of habitats and diversity of flora and fauna but also provides a wide range of land use options.

While this landscape represents a unique conservation heritage in the world, it at the same time faces very serious conservation and development challenges mainly due to high population growth rate (2-4% per year) and severe poverty levels. As described, the mosaic composition is unique in management as well. E.g. much as the tropical high forest and the partly the afro-montane forest is ever wet and less prone to fire, the savanna grassland is highly flammable. It is in this savanna that more than 90% of large ungulates and carnivores reside. In the past, the management processes in the landscape emphasized control of illegal activities and poaching with little emphasis on comprehensive fire management strategies.

Given that fire and in this case uncontrolled fire negatively affects the ecosystem, there is a great need to develop a comprehensive strategy that will respond to the fire management challenges. This is partly due to the fact that though in the past fire used to be natural and naturally caused, there is increased human set fire in the landscape. The human set fire which is either accidental or malicious is a great risk to the Albertine rift biodiversity. E.g. the recently man-set fire in the volcano and Mgahinga national parks that destroyed almost one eighth of the national parks in question was human caused.

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The Greater Virunga Landscape has diverse vegetation types with varied levels of vulnerability to fire. While fires are not very common in the high altitude areas, it is normally very destructive whenever it occurs. Unfortunately, the protected area authorities do not have clearly developed strategies for combating fires. The Greater Virunga Transboundary Secretariat has discussed this problem with the protected area authorities in Uganda, Rwanda and DRC and agreed to come up with a Transboundary fire management plan and also coordinate regional capacity building for effective management of forest fires.

Proposed fire management plan process

In order for the Secretariat to develop and implement a Transboundary fire management plan, the following activities will be undertaken:

1. Information Gathering:
 - a. Review background information related to the countries' policies and legislation on forest fire, including the Master Plans which exist for the management of forest fires both in National Parks and Forest Reserves.
 - b. Review past and current activities by governments and other stakeholders including local communities and bilateral and multilateral organizations in forest fire prevention and management;
 - c. Review existing forest fire management practices and available equipment and infrastructure;
 - d. Review success stories elsewhere in fire prevention and compare the cost implications for the region including possibility of fire insurance.
 - e. Assess any possible local approach to fire prevention
 - f. Understand the reasons for increased fire incidences in the region
 - g. Categorize existing fire types, cause and possible prevention measures
 - h. Document any recorded losses due to fire damage and suggest ways of recovery and prevention.
 - i. Consult with all relevant stakeholders on forest fire management problems and possible solutions;
2. Plan development
 - a. Develop jointly with all relevant stakeholders a strategy and plan for the prevention and management of forest fire in the Greater Virunga Landscape;
 - b. Include clear outline of the capacity building needs for effective fire management
 - c. Include detailed financial proposal.
3. Implementation
 - a. Implement the Transboundary fire management strategy and plan including monitoring and evaluation.

2. Overview of USFS Support for Fire Management Planning in the Greater Virunga Landscape

Toward this end, the USFS will engage a technical assistance team to work in collaboration with the Greater Virunga Transboundary Secretariat to support the development of a Transboundary fire management plan (focus on step 2 from the above "proposed fire management plan process"). The team will work at the Secretariat headquarters for introductory meetings and work sessions and also carry out some field visits in order to meet with land management ministry staff, local NGOs, communities, and local authorities to better understand the practical challenges and opportunities.

Objective: Scoping/fact finding mission that will generate sufficient information and on-ground understanding for the second mission which will focus on fire management planning process and development of the final plan.

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Location and Timing: Draft itinerary follows:

Estimated Dates	Objective	Hotel	Country
9 th May	Arrival date in Kampala, Uganda	Musa Courts	Uganda
10 th May	Hold discussions with GVTCS staff	Musa Courts	Uganda
11 th May	Meet UWA and NFA staff and travel to fort portal	Mountains of the moon hotel	Uganda
12 th Morning	Visit Kibale and travel to Kasese	Margarita inn Hotel	Uganda
13 th afternoon	Visit Rwenzori and then Queen	Margarita Inn Hotel	Uganda
14 th May	Travel to Buhoma through Queen Elizabeth and have a discussion	Volcanoe Safaris	Uganda
15 th May	Travel to Mgahinga and sleep in Musanze	La Palme	Rwanda
16 th May	Have a rest in Musanze	La Palme	Rwanda
17 th May	Hold a meeting with the Musanze team and travel to Kigali	Milles Collines	Rwanda
18 th May	Have discussion at the office	Milles Collines	Rwanda
19 th May	Meet RDB team, WCS and IGCP	Milles Collines	Rwanda
20 th May	Visit Nyungwe	PCFN rest house	Rwanda
21 th May	Meet with USAID Rwanda	Milles Collines	Rwanda
22 nd May	Discussions at the office and visit forestry	Milles Collines	Rwanda
23 rd May	Rest	Milles Collines	Rwanda
24 th	Meet with Ministry of Forestry Wrap up and travel back		Rwanda

USFS Team Composition:

This USFS team will consist of two to three individuals with a collective set of experience in:

- technical, procedural aspects of fire management plan development;
- analyzing and addressing fire impacts on wildlife, biodiversity, carbon release, soil damage, etc.;
- social and community engagement in fire management initiatives; and
- Training in fire management techniques to diverse stakeholders and partners.

It will be important for USFS experts to understand that central African institutions have far less resources and capacity than the US Forest Service, so USFS experts must be capable of adapting USFS methodologies and processes to a different environment, one that has less structure, less bureaucracy and less oversight and resources to manage forest areas. Moreover, understanding the central African context will be paramount in successfully analyzing and suggesting appropriate mechanisms for planning.

USFS Team Tasks:

- 1) Contribute substantively to the development of a draft Transboundary fire management plan;
- 2) Carry out training sessions on core fire management planning principles as needed;
- 3) Develop a trip report on the mission (see description under ‘Deliverables’).

Tasks for the Greater Virunga Transboundary Secretariat:

- 1) Prior to the arrival of the USFS team, the Greater Virunga Transboundary Secretariat will gather all available and relevant information, the special areas of engagement, and projects being implemented for the team to review to allow them to adequately prepare for the work to be done

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while in-country. As much as possible, this information should be sent to the USFS team electronically prior to their arrival. Any documents not available in an electronic format should be made available to the team upon arrival.

- 2) Identify points of contact, including designated lead(s) for fire management planning, who will accompany the USFS team while in the Landscape and be available for follow up on information exchanges once the team has departed.
- 3) Inform local stakeholders and other entities operating in the areas/zones of interest of the team's arrival and purpose of the mission, such that interactions with the USFS team will be most effective and efficient in gathering the data, needs, perspectives, etc. necessary for the mission.
- 4) In-country logistical support:
 - a. Inform local officials of team's arrival and purpose of their engagement in region.
 - b. Arrange for meetings with appropriate key officials and partners.
 - c. Arrange for in-country transportation and necessary lodging reservations.
 - d. Arrange for a translator to accompany the USFS team during the mission (TBD).

Deliverables:

Trip Report: the USFS team will produce a report detailing activities during the mission and all results and findings of the work toward the accomplishment of the objectives and tasks listed above. This report will include, but not be limited to:

- 1) Executive summary
- 2) Introduction
- 3) Issues, findings, & recommendations
- 4) Next steps:
 - a. A prioritized list of future tasks that should be addressed in advancing the fire management plan development and implementation in the Greater Virunga Landscape,
 - b. A prioritized list of future tasks for possible USFS engagement on fire management planning implementation
- 5) Appendices
 - a. Scope of work
 - b. Draft Transboundary fire management plan outline or other pertinent documents the GVTs and partners produce
 - c. Itinerary
 - d. List of contacts made

Read ahead / background documents:

- USFS/CARPE Land use planning guides: <http://carpe.umd.edu/Plone/resources/carpemgmttools>
- USAID Central Africa Regional Program for the Environment - <http://carpe.umd.edu/>
- CARPE Information Management Tool: <http://carpe-infotool.umd.edu/IMT/>
- The Forests of the Congo Basin: State of the Forest 2008 - <http://www.cbf.org/Stateoftheforest.html>
- USFS Trip Reports: <http://rportal.net/library/usda-forest-service-document-collection>
- USFS Overview Activities in Congo Basin: <http://www.fs.fed.us/global/globe/africa/basin.htm>
- FIRMS project (Fire Information for Resource Management) <http://maps.geog.umd.edu>
- MODIS subset images including extracts for the Greater Virunga Landscape <http://maps.geog.umd.edu/firms/subsets.htm>

Appendix B. Itinerary

Estimated Dates	Objective	Hotel	Country
9 th May	Arrival date in Kampala, Uganda	Musa Courts	UG
10 th May	Hold discussions with UWA, NFA and WCS at UWA offices	Musa Courts	UG
11 th May	Hold discussions with TCS staff and travel to fort portal	Mountains of the moon hotel	UG
12 th Morning	Visit Kibale and Hold discussions with the staff	Mountains of the moon hotel	UG
13 th afternoon	Travel to Queen Elizabeth National park and hold discussions with park staff and key partners	Jacana Resort	UG
14 th May	Travel to Buhoma through Queen Elizabeth and have a discussion	Buhoma Community Lodge	UG
15 th May	Travel to Mgahinga and sleep in Musanze	La Palme	Rwanda
16 th May	Have a rest and brief discussions Musanze	La Palme	Rwanda
17 th May	Hold a meeting with the Musanze team and travel to Kigali	Select Boutique	Rwanda
18 th May	Have discussion at the office	Select Boutique	Rwanda
19 th May	Travel to Nyungwe and have discussions with the park management and key partners in Nyungwe	PCFN rest house	
20 th May	Finalise Visit in Nyungwe and travel to Kigali	Select Boutique	Rwanda
21 st May	Hold meeting at the US Embassy with Embassy and USAID staff	Select Boutique	Rwanda
22 nd May	Hold discussions with the TCS staff	Select Boutique	Rwanda
23 rd May	Rest	Select Boutique	Rwanda
24 th May Morning	Hold discussions with RDB, NAFA, Forestry ministry, REMA, IGCP and WCS	Select Boutique	Rwanda
24 th Afternoon	Wrap up and travel back		Rwanda

Appendix C. List of Contacts

Country	Name	Organization
Transboundary	Tom Sengalama	Greater Virunga Transboundary Secretariat
Transboundary	Mark David Mwine Regional Enterprise Officer	International Gorilla Conservation Programme
Uganda	Richard Kapere Senior Planning & Environmental Impact Assessment Officer	Uganda Wildlife Authority, Kampala
Uganda	Sam Mwandha Director of Conservation	Uganda Wildlife Authority, Kampala
Uganda	Asa Kule Musinguzi Conservation Area Manager	Uganda Wildlife Authority, Kampala
Uganda	Edward Nector Mwavu Lecturer	Makerere University, Department of Forest Biology and Ecosystems Management
Uganda	Lawrence J.B. Orikiriza Lecturer,	Makerere University, Department of Forest Biology and Ecosystems Management
Uganda	Charity Chebet Plantation Manager	National Forest Authority Orahu National Forest Reserve
Uganda	Edger Margaret	Queen Elizabeth National Park
Uganda	Wilson Katamigwa, Chief Warden	Inshasha, Queen Elizabeth National Park
Uganda	Charles Tumwesigye, Conservation Area Manager Jennifer Atuhairwe	Bwindi/Mgahinga Conservation Area—Uganda Wildlife Authority
Uganda	Miriam van Heist, Deputy Director Robert Bitariho, Research Officer Resource Use and Ecological Monitoring	Institute of Tropical Forest Conservation
Uganda	Pontious Ezums	Mgahinga National Park,

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		Kisoro
Rwanda	Prosper Uwingeli, Park Supervisor	Volcanoes National Park
Rwanda	Dennis Weller, Mission Director Aimee Mpambara, Rural Development Specialist	USAID
Rwanda	Louis Rugerinyange	ORTPN, Nyungwe National Park
Rwanda	J P Karangwa, Army of Rwanda Police Chief	Nyungwe National Park vicinity

Appendix D. Annotated Fire Management Plan Format

Supplied by the Uganda Wildlife Authority during our visit. Italics indicate our suggestions for strengthening the plans.

Section 1: Executive summary

--As part of the document summary, specific next steps should be included

Add sections: Introduction

--Purpose and Scope

--Direction for creating this plan

Strategy

--Goals and objectives

--Identify values and risks

Stakeholders

--Identify steps to be taken in involving villages, governmental organizations, NGOs, and other entities

--Reach consensus on the ongoing roles of stakeholders

Prevention

--Outline how public education campaign on fire will be implemented

Section 2: General PA [Project Area] Description: location, vegetation types, and fauna.

--Also include description of fire regimes (characteristic fire frequency and severity) and relevant changes in the fire regimes

Section 3: Weather/climate monitoring

Section 4: Description of the PA Fire management zones

- Fire Zone map of the PA
- Possible location of Fire lines
- Location of Firebreaks
- Zone accessibility
- Water sources
- Vegetation type

Section 5: Type of fire burn for each zone

Early burning:

- Objectives
- Activities and time period
- Equipment
- Personnel

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Fighting wildfires:

- Objectives
- Activities and time period
- Equipment
- Personnel
- *Minimum impact suppression tactics*

Add sections: Incident Coordination System

--Describe detection and reporting process

--Detail the process for identifying who is in charge,

and how fire-fighting resources will be organized and implemented.

This will require considerable pre-work and meetings with all those involved.

Finance

--Present budget for annual costs of early burning and fighting wildfires

Section 6: Plan period, monitoring and review

Appendices

Appendix 1: Wildfire Report Form

Appendix 2: Daily Weather Observation Log

Glossary of Wildfire Terminology

Bibliography

Appendix E1. Suggested field operational training outline in fire fighting, fire behavior, and fire ecology.

Training Schedule	Module	Contents
Day 1	<p>Introductions</p> <p>Module 1 Fire Ecology, Fire Behavior and Weather</p> <p>Module 2 –Organizing, Supervising, and Managing Fires</p>	<p>-Introductions / Relevance / Contract of Learning / etc</p> <p>Overview of Fire Ecology Fire Behavior and Fire Weather</p> <p>Coordination System (ICS) Leadership and Supervision</p>
Day 2	<p>Module 3 – Wildfire Size up and Initial Attack</p> <p>Module 4 – Wildland Fire Suppression Methods and Tactics</p>	<p>Wildfire size up and Initial Attack Risk Management Process</p> <p>Parts of a fire Tactics - Direct vs Indirect Suppression methods, tools use, fireline construction, firing methods, burnout, and other tactics</p>
Day 3	<p>Module 5 - Safety</p> <p>Module 6 – Fire Regimes, Fire Return Interval</p>	<p>Common denominators of fatality fires 18 Watchout Situations 10 Standard Orders</p> <p>Overview of Fire Regime, Fire Return Interval, and Departure Concepts</p>
Day 4	Basic Suppression Training Nearby	Field Train the Trainer session

Appendix E2. Suggested program leadership training outline in fire fighting, fire behavior, and fire ecology.

Training Schedule	Module	Contents
Day 1	Introductions Module 1 Fire Ecology, Fire Behavior and Weather Module 2 –Organizing, Supervising, and Managing Fires	-Introductions / Relevance / Contract of Learning / etc Overview of Fire Ecology Fire Behavior and Fire Weather Coordination System (ICS) Leadership and Supervision
Day 2	Module 3 – Wildfire Size up and Initial Attack Module 4 – Wildland Fire Suppression Methods and Tactics Module 5 – Synthesis: Implications of Fire Ecology, Fire Behavior, and Fire Fighting Tactics in the Fire Management Planning Process	Wildfire size up and Initial Attack Risk Management Process Parts of a fire Tactics - Direct vs Indirect Suppression methods Importance of incorporating fire ecology and fire operational constraints in fire management planning

The audience is national fire planners, NGO counterparts, and GVTS leadership