Atlantic Resources Limited
P. O. Box 5485, Rehab Junction, Paynesville, Montserrado, Liberia

FOREST MANAGEMENT CONTRACT AREA"(FMC P)"
Rivergee, Maryland and Grand Kru Counties
25 years FOREST MANAGEMENT PLAN
2nd (Final Version)

2009 – 2034

Submitted to:

FORESTRY DEVELOPMENT AUTHORITY
REPUBLIC OF LIBERIA

Dubo River, Grand Kru County

Liberia's Forestry Development Authority

FOREST COVER MAP of LIBERIA

Prepared by the Geographic Information Systems & Remote Sensing Laboratory of FDA

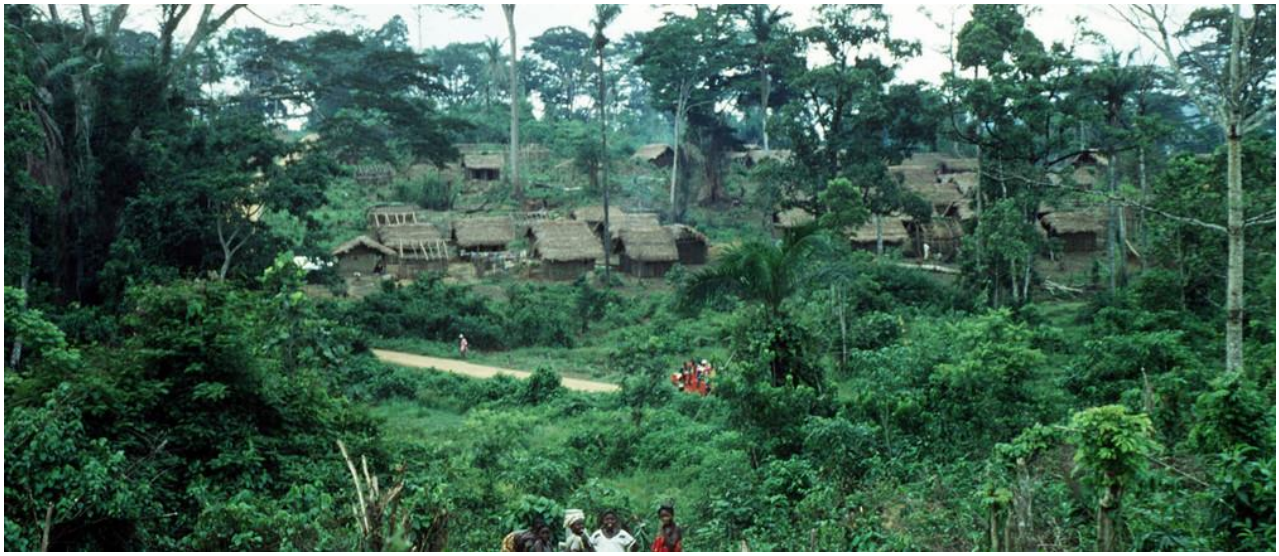
Acknowledgements

The Atlantic Resources and Wood Processing Inc. would like to extend our sincere thanks to the representatives from FDA forestry divisions, agencies and organizations who provided technical and strategic input into the development of Atlantic Resources Strategic Forest Management Plan. We also thank all of our community partners who helped make this project possible. Their support and insight have added tremendous value to this plan.

Atlantic Resources and Wood Processing adopted this Plan at its meeting of January, 2014.

For reference purposes, this document should be cited as follows; managing and sustaining the commercial forest use: Atlantic Resources Strategic Forest Management Plan. Rehab Junction, Paynesville City, Republic of Liberia

TABLE OF CONTENTS



A local settlement at the fringe of Area P

EXECUTIVE SUMMARY

Atlantic Resources and Wood Processing Inc.s awarded through a transparent bidding process, a Forest Management Contract area “P” (119,344 Hectares) located in the rural forested areas of River Gee, Maryland and Grand Kru Counties, respectively. The Rural forest includes all the trees within the Contract area boundaries. The trees in this forest provide a wide range of environmental, ecological, social, cultural and economic benefits. The benefits from air pollution filtration and energy savings. The planned and controlled harvesting of Forest will be significant to achieving a balance in forest ecosystem through the integration of forest exploitation and forest conservation. This value does not include the physical health benefits related to natural cooling and air quality improvement, or the documented mental health benefits of simply having trees in our rural communities. This forest is a shared resource that benefits the entire community

This final version of the Strategic Forest Management (SFMP) attempts systematically exploit the potential of forest harvesting operation and the realistically and sustainably managing the Contract area “P”. This plan gives rise to the formulation of a 5-year Forest and Compartment management and also successive Annual Operation plans (AOPs). The overall goal is to ensure the sustainable management of FMC Area “P” forest thereby making sure that benefits deriving thereof are equally enjoyed by all especially the rural communities dwellers who live at the fringes of the Contract Area.

Table 1 - A summary of information about Atlantic Resources FMC Area “P”

MEASURE	RESULTS
Num of trees in Area P	
Canopy cover	76.6% to 82%*
Canopy cover target	40%
Number of trees on public lands	approximately 11.4 millio(70%)
Number of trees on community lands	NA

Characteristics of the trees that make up Area P forest

- 38% are less than 85 cm diameter
- 18% are between 55 cm diameter and 75 cm diameter
- 14% are greater than 85 cm diameter
- predominance of native species (94%)

Structural value of the Rural forest NA

Ecological services** provided by the Rural forest valued at NA

The plan summarizes the activities and projects that will be achieved during the 25-years of contract duration. The implementation of these activities and projects will enhance the realization of the goals and objectives of Atlantic Resources and Wood Processing Inc. The Management framework is based on the vision, goal and objectives to be achieved within the next 20-year felling cycle. If focuses exclusively on the forcast ambition of Atlantic Resources and Wood Processing Inc. to achieve ecological, economical and social viability context of the operation which are regarded as an important component in determining the overall sustainability of forest resource exploitation

There are three basic objectives provided in the SFMP aimed at managing the contract area. They are to produce local, national, international forest products for the benefits of the affected communities, Government and contract holder

The objectives of the plan is to serve as a guide in the management, ensuring that the continuity of the forest and the increasing in public and communities involvement in the management of FMC Area “P”.
It is to continue to provide benefits to the community. Atlantic Resources and Wood Processing Forest Management Plan (referred to as “the Plan” in this document) was developed as a means to identify the efforts required to achieve a healthy, sustainable Forest Management Plan.

A portion of this plan describes the forest ecology and management strategy, including FMC Area “P” description of forest resources, topography/landscape, environmental constraints, silviculture history, proposed management prescriptions, sustainable harvest level requirement; the proposed schedule of best forest management practices.

Vision

The long term vision for Atlantic Resources Ltd. and strategic goals for this Plan were developed in consultation with Various Departments within the FDA, staff from various divisions, external stakeholders and the community in general.

Long Term Vision

Atlantic Resources Ltd. *is a vital green infrastructure that creates sustainable harvesting operations, supports habitat and biodiversity, offers opportunities for communities and education, fosters economic prosperity and enhances quality of life for everyone in the city.*

Vision for the Final 20 Year Life of this Plan

The 20 year vision was also developed in consultation with others and provides a vision that has been tailored to the time frame of this Plan.

A healthy and sustainable managed forest, incorporating sound harvesting practices and community partnership.

Strategic Goals

1. **INCREASE CANOPY COVER**
   Protect, maintain and expand the forest Area “P” to achieve a healthy, sustainable harvesting operation there maintaining an acceptable canopy cover.
2. **ACHIEVE EQUITABLE DISTRIBUTION**
   Achieve an equitable distribution of the forest Area “P” through sustainable harvesting practices.
3. **INCREASE BIODIVERSITY**
   Increase biodiversity sustainable harvesting operations to improve forest resiliency and respond to climate change.
4. **INCREASE AWARENESS**
   Increase awareness of the value of trees, the natural environment and the sensitivity of these resources and its social and economical benefits for all.
5. **PROMOTE STEWARDSHIP**

Promote stewardship and education of the multiple benefits of the contract Area “P” and build collaborative
Partnerships with all affected communities for sustainably managing the forest Area “P”.

6. **IMPROVE MONITORING**
   Improve information management systems and enhance the ability to inventory, monitor and analyze the Concession forest.

Atlantic Resources Ltd. plays an integral role in managing Liberia’s Rural forest. This study has led development of this Plan and will be responsible for ensuring much of its implementation. It is through the performance of sustainable management of the forest that the goals of the Plan will be brought to fruition

Four Service Pillars

1. Maintenance of the Forest through strategic harvesting operations
2. Protection of the Forest and Natural Heritage
3. Planting to Expand the Forest
4. Planning to Ensure Strategic Advancement of Forest Management Objectives

TECHNICAL DESCRIPTION OF THE AREA

General location

Forest Management Contract area “P” lies within Latitudes 4º48’0” - 5º6’0” North of the equator and Longitudes 8º0’0” - 8º18’0” West of the Greenwich meridian and it is located in Grand Kru, Maryland and River Gee Counties, Southeastern Liberia.

Forest Management Contract area “P” is 360 miles accessible by primary motor road by way of Monrovia, Gbarnga, Tappita, Zwedru and John David’s Town, and is ***68*** miles accessible to the ***Port of Harper,*** Maryland County.

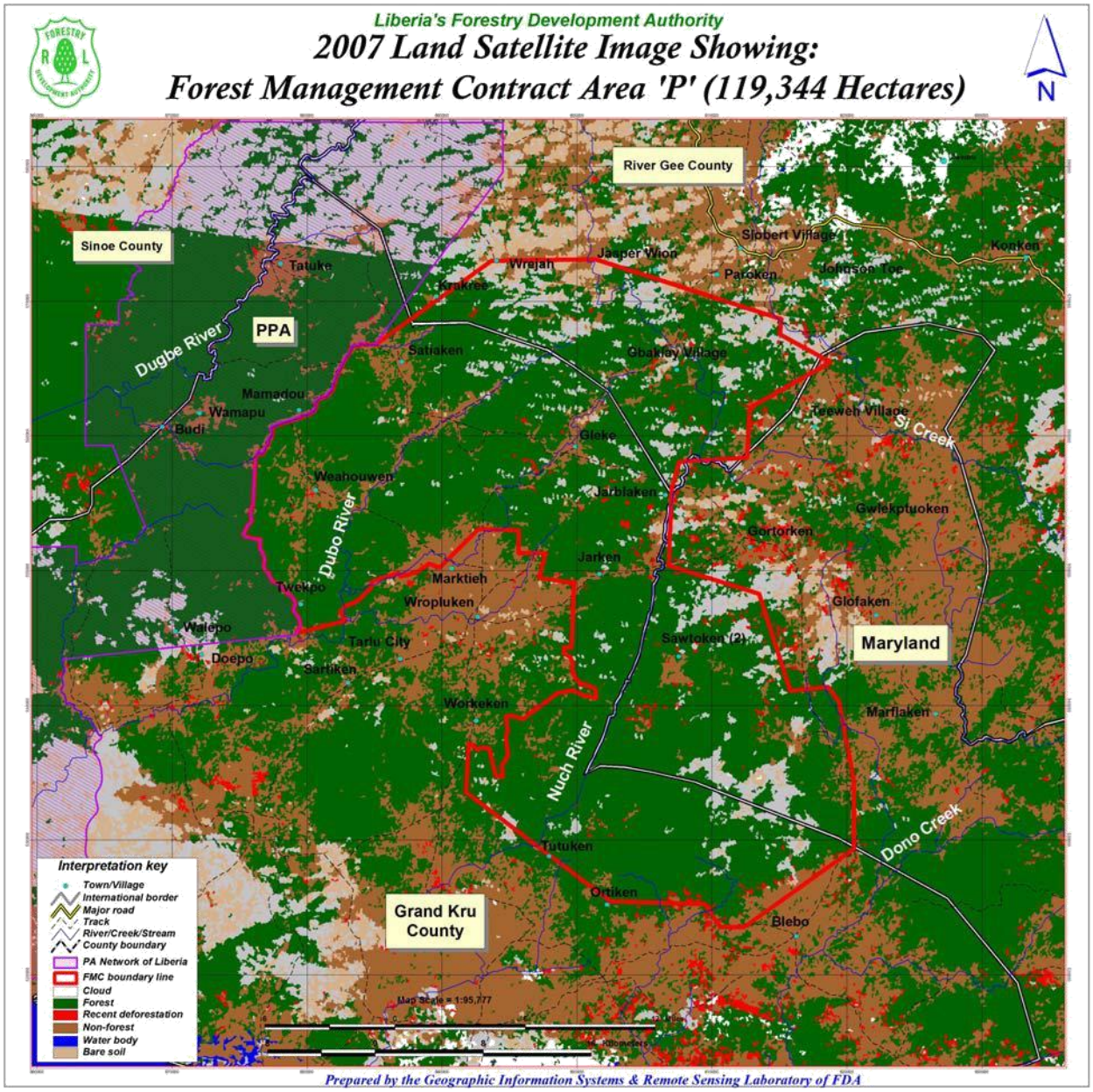
Metes and Bounds

Starting from Bleebo Town, (4º43’50.97”N - 7º56’57.59”W) thence a line runs N 83º W for 4,178 meters to the point of COMMENCEMENT (4º44'08.82"N-7º59'11.21"W); thence a line runs Due West for 1,800 meters to a point (4º44'07.35"N-8º00'10.61"W); thence a line runs N 33º W for 2,039 meters to a point (4º45'02.99"N-8º00'46.49"W); thence a line runs N 88º W for 6,994 meters to a point (4º45'10.57"N-8º04'33.61"W); thence a line runs N 53º W for 13,435 meters to a point (4º49'34.41"N-8º10'20.62"W); thence a line runs N 3º E for 3,630 meters to a point (4º51'31.73"N-8º10'15.03"W); thence a line runs S 64º E for 423 meters to a point (4º51'25.70"N-8º10'02.81"W); thence a line runs S 45º E for 390 meters to a point (4º51'16.85"N-8º09'53.78"W); thence a line runs N 56º E for 326 meters to a point (4º51'22.69"N-8º09'44.98"W); thence a line runs S 82º E for 611 meters to a point (4º51'19.68"N-8º09'25.22"W); thence a line runs S 13º E for 2,104 meters to a point (4º50'13.57"N-8º09'09.59"W); thence a line runs S 79º E for 508 meters to a point (4º50'10.23"N-8º08'53.36"W); thence a line runs N 1º W for 882 meters to a point (4º50'38.81"N-8º08'54.06"W); thence a line runs N 30º E for 848 meters to a point (4º51'02.45"N-8º08'40.35"W); thence a line runs N 6º W for 1,353 meters to a point (4º51'46.04"N-8º08'44.73"W); thence a line runs N 10º E for 597 meters to a point (4º52'05.06"N-8º08'41.22"W); thence a line runs N 6º W for 1,029 meters to a point (4º52'38.12"N-8º08'44.57"W); thence a line runs Due East for 533 meters to a point (4º52'38.12"N-8º08'27.26"W); thence a line runs S 72º E for 750 meters to a point (4º52'30.54"N-8º08'04.16"W); thence a line runs N 53º E for 3,261 meters to a point (4º53'34.40"N-8º06'39.66"W); thence a line runs N 81º E for 1,146 meters to a point (4º53'40.02"N-8º06'03.08"W); thence a line runs S 63º E for 813 meters to a point (4º53'28.25"N-8º05'39.36"W); thence a line runs S 78º E for 1,009 meters to a point (4º53'21.48"N-8º05'07.37"W); thence a line runs N 7º W for 720 meters to a point (4º53'44.72"N-8º05'10.04"W); thence a line runs N 71º W for 1,233 meters to a point (4º53'58.07"N-8º05'47.88"W); thence a line runs N 34º W for 473 meters to a point (4º54'10.75"N-8º05'56.51"W); thence a line runs N 29º W for 555 meters to a point (4º54'26.42"N-8º06'05.00"W); thence a line runs N 1º E for 613 meters to a point (4º54'46.23"N-8º06'04.56"W); thence a line runs N 20º W for 472 meters to a point (4º55'00.56"N-8º06'09.93"W); thence a line runs N 58º W for 565 meters to a point (4º55'10.20"N-8º06'25.52"W); thence a line runs Due North for 432 meters to a point (4º55'24.20"N-8º06'25.64"W); thence a line runs Due East for 592 meters to a point (4º55'24.06"N-8º06'06.37"W); thence a line runs N 2º E for 4,818 meters to a point (4º57'59.92"N-8º06'00.54"W); thence a line runs N 81º W for 2,629 meters to a point (4º58'12.83"N-8º07'24.90"W); thence a line runs N 15º E for 1,885 meters to a point (4º59'11.45"N-8º07'08.28"W); thence a line runs Due West for 2,015 meters to a point (4º59'11.45"N-8º08'13.75"W); thence a line runs Due North for 1,707 meters to a point (5º00'06.70"N-8º08'13.75"W); thence a line runs N 88º W for 2,984 meters to a point (5º00'10.33"N-8º09'50.66"W); thence a line runs S 45º W for 4,035 meters to a point (4º58'37.99"N-8º11'23.42"W); thence a line runs N 73º W for 847 meters to a point (4º58'46.29"N-8º11'49.66"W); thence a line runs S 56º W for 1,007 meters to a point (4º58'27.87"N-8º12'16.68"W); thence a line runs S 74º W for 1,311 meters to a point (4º58'16.32"N-8º12'58.12"W); thence a line runs N 32º W for 295 meters to a point (4º58'24.42"N-8º13'03.20"W); thence a line runs S 72º W for 2,080 meters to a point

(4º58'03.93"N-8º14'07.60"W); thence a line runs S 4º W for 463 meters to a point (4º57'49.22"N-8º14'08.62"W); thence a line runs S 45º W for 1,467 meters to a point (4º57'15.78"N-8º14'42.10"W); thence a line runs S 68º W for 961 meters to a point (4º57'04.14"N-8º15'11.15"W); thence a line runs S 41º W for 548 meters to a point (4º56'50.73"N-8º15'22.79"W); thence a line runs S 30º E for 781 meters to a point (4º56'28.72"N-8º15'10.06"W); thence a line runs S 76º W for 3,716 meters to the point on the Grand Kru-River Gee Proposed Protected Area boundary line (4º55'59.85"N-8º17'07.16"W); thence a line runs Due North for 141 meters to a point (4º56'04.41"N-8º17'07.13"W); thence a line runs N 38º E for 266 meters to a point (4º56'11.22"N-8º17'01.82"W); thence a line runs N 25º E for 181 meters to a point (4º56'16.56"N-8º16'59.36"W); thence a line runs N 4º E for164 meters to a point (4º56'21.91"N-8º16'58.96"W); thence a line runs N 16º W for 434 meters to a point (4º56'35.44"N-8º17'02.84"W); thence a line runs N 33º W for 724 meters to a point (4º56'55.14"N-8º17'15.64"W); thence a line runs N 5º E for 152 meters to a point (4º57'00.05"N-8º17'15.20"W); thence a line runs N 28º E for 276 meters to a point (4º57'07.97"N-8º17'11.01"W); thence a line runs N 14º W for 317 meters to a point (4º57'17.97"N-8º17'13.47"W); thence a line runs N 21º W for 215 meters to a point (4º57'24.39"N-8º17'16.02"W); thence a line runs N 41º W for 279 meters to a point (4º57'31.22"N-8º17'22.00"W); thence a line runs N 69º W for 242 meters to a point (4º57'34.03"N-8º17'29.47"W); thence a line runs N 26º W for 280 meters to a point (4º57'42.17"N-8º17'33.33"W); thence a line runs N 61º W for 274 meters to a point (4º57'46.47"N-8º17'41.11"W); thence a line runs N 36º W for 380 meters to a point (4º57'56.46"N-8º17'48.28"W); thence a line runs N 64º W for 658 meters to a point (4º58'05.79"N-8º18'07.50"W); thence a line runs N 26º W for 760 meters to a point (4º58'27.85"N-8º18'18.07"W); thence a line runs N 56º W for 238 meters to a point (4º58'32.15"N-8º18'24.52"W); thence a line runs N 14º W for 321 meters to a point (4º58'42.22"N-8º18'27.08"W); thence a line runs N 11º E for 357 meters to a point (4º58'53.64"N-8º18'24.90"W); thence a line runs N 2º W for 232 meters to a point (4º59'01.20"N-8º18'25.22"W); thence a line runs N 19º W for 412 meters to a point (4º59'13.88"N-8º18'29.54"W); thence a line runs N 37º W for 319 meters to a point (4º59'22.10"N-8º18'35.87"W); thence a line runs Due North for 497 meters to a point (4º59'38.20"N-8º18'35.87"W); thence a line runs N 11º E for 178 meters to a point (4º59'43.91"N-8º18'34.78"W); thence a line runs N 28º W for 114 meters to a point (4º59'47.12"N-8º18'36.47"W); thence a line runs N 88º W for 355 meters to a point (4º59'47.48"N-8º18'48.06"W); thence a line runs N 75º W for 763 meters to a point (4º59'53.88"N-8º19'12.04"W); thence a line runs N 37º W for 236 meters to a point (4º59'59.96"N-8º19'16.69"W); thence a line runs N 35º E for 380 meters to a point (5º00'10.07"N-8º19'09.60"W); thence a line runs N 15º E for 248 meters to a point (5º00'17.84"N-8º19'07.51"W); thence a line runs N 45º E for 498 meters to a point (5º00'29.30"N-8º18'56.10"W); thence a line runs N 4º E for 118 meters to a point (5º00'33.13"N-8º18'55.82"W); thence a line runs N 22º W for 170 meters to a point (5º00'38.22"N-8º18'57.86"W); thence a line runs N 5º E for 275 meters to a point (5º00'47.08"N-8º18'57.06"W); thence a line runs N 7º W for 389 meters to a point (5º00'59.60"N-8º18'58.53"W); thence a line runs N 31º E for 335 meters to a point (5º01'08.80"N-8º18'52.88"W); thence a line runs N 3º E for 3,646 meters to a point (5º03'06.45"N-8º18'46.90"W); thence a line runs N 40º E for 388 meters to a point (5º03'15.97"N-8º18'38.80"W); thence a line runs S 48º E for 224 meters to a point

(5º03'11.21"N-8º18'33.40"W); thence a line runs N 54º E for 329 meters to a point (5º03'17.52"N-8º18'24.79"W); thence a line runs N 10º E for 364 meters to a point (5º03'29.00"N-8º18'22.71"W); thence a line runs N 43º E for 377 meters to a point (5º03'37.69"N-8º18'14.30"W); thence a line runs Due North for 345 meters to a point (5º03'48.87"N-8º18'14.41"W); thence a line runs N 48º E for 301 meters to a point (5º03'55.18"N-8º18'07.25"W); thence a line runs N 8º E for 348 meters to a point (5º04'06.46"N-8º18'05.69"W); thence a line runs N 23º W for 309 meters to a point (5º04'15.56"N-8º18'09.63"W); thence a line runs N 63º E for 564 meters to a point (5º04'23.94"N-8º17'53.34"W); thence a line runs N 76º E for 892 meters to a point (5º04'30.97"N-8º17'25.21"W); thence a line runs N 70º E for 815 meters to a point (5º04'40.02"N-8º17'00.34"W); thence a line runs S 84º E for 136 meters to a point (5º04'39.57"N-8º16'55.99"W); thence a line runs N 4º E for 175 meters to a point (5º04'45.23"N-8º16'55.62"W); thence a line runs N 85º E for 517 meters to a point (5º04'46.73"N-8º16'38.90"W); thence a line runs N 54º E for 575 meters to a point (5º04'57.64"N-8º16'23.87"W); thence a line runs N 24º E for 328 meters to a point (5º05'07.38"N-8º16'19.64"W); thence a line runs N 27º W for 260 meters to a point (5º05'14.80"N-8º16'23.43"W); thence a line runs N 47º E for 561 meters to a point (5º05'27.24"N-8º16'10.13"W); thence a line runs N 77º E for 442 meters to a point (5º05'30.44"N-8º15'56.13"W); thence a line runs N 42º E for 700 meters to a point (5º05'47.09"N-8º15'40.82"W); thence a line runs N 15º E for 866 meters to a point (5º06'14.36"N-8º15'33.69"W); thence a line runs N 26º E for 1,708 meters to a point (5º07'03.84"N-8º15'09.19"W); thence a line runs N 36º E for 453 meters to a point (5º07'15.65"N-8º15'00.45"W); thence a line runs N 24º E for 558 meters to a point (5º07'32.15"N-8º14'53.01"W); thence a line runs N 84º E for 542 meters to a point (5º07'33.87"N-8º14'35.53"W); thence a line runs N 23º E for 168 meters to a point (5º07'38.87"N-8º14'33.40"W); thence a line runs S 78º E for 449 meters to a point (5º07'35.78"N-8º14'19.13"W); thence a line runs N 79º E for 265 meters to a point (5º07'37.48"N- 8º14'10.67"W); thence a line runs S 81º E for 365 meters to a point moving away from the Proposed Protected Area boundary line (5º07'35.65"N-8º13'58.94"W); thence a line runs N 54º E for 10,711 meters to a point near the Dweken, Nyonken motor road (5º10'58.47"N-8º09'17.50"W); thence a line runs N 89º E for 7,742 meters to a point across the Grand Cess/Nuch River (5º11'04.09"N-8º05'05.13"W); thence a line runs S 72º E for 14,491 meters to a point near the Si creek (5º08'38.15"N-7º57'40.17"W); thence a line runs S 5º W for 1,133 meters to a point (5º08'01.65"N-7º57'43.20"W); thence a line runs S 61º E for 4,261 meters to a point (5º06'54.14"N-7º55'42.04"W); thence a line runs S 60º W for 6,888 meters to a point (5º05'03.30"N-7º58'56.08"W); thence a line runs S 3º W for 3,711 meters to a point (5º03'03.39"N-7º59'03.22"W); thence a line runs S 87º W for 4,981 meters to a point (5º02'53.52"N-8º01'45.02"W); thence a line runs S 17º W for 2,116 meters to a point crossing the Gi creek and the Gleke, Jarblaken, Dweken, Martuken and Gortorken motor road to a point (5º01'48.29"N-8º02'04.73"W); thence a line runs S 2º W for 5,749 meters to a point (4º58'41.98"N-8º02'11.57"W); thence a line runs S 73º E for 7,021 meters to a point (4º57'33.93"N-7º58'34.47"W); thence a line runs S 18º E for 7,628 meters to a point (4º53'38.44"N-7º57'19.91"W); thence a line runs N 84º E for 2,823 meters to a point (4º53'48.79"N-7º55'48.69"W); thence a line runs S 36º E for 1,386 meters to a point (4º53'12.54"N-7º55'23.29"W); thence a line runs S 10º E for 5,944 meters to a point (4º50'02.66"N-7º54'48.07"W); thence a line runs Due South for 5,137 meters to a point near

the Newaken, Bleebo town motor road (4º47'16.36"N-7º54'47.49"W); thence a line runs S 54º W for 9,972 meters to the point of commencement (4º44'08.82"N-7º59'11.21"W), embracing (One Hundred and Nineteen Thousand Three Hundred and Forty Four) 119,344 hectares of forest land and no more.



Forest Description

Physical description of the area

The infrastructure, transport, communication and energy are in fairly bad state. In the Forest Management Contract area “P”, most of the infrastructure (roads, schools, clinic, etc) would be developed by investors as part of the contractual obligation.

When commercial logging activities resume in this area, some improvement in infrastructure are expected. In the short run, infrastructure may not pose a constraint, but in the long run, it would.

However, the port of Harper, which is sixty eight (68) miles accessible by primary and secondary motor roads from Forest Management Contract area "P", which is in good condition to facilitate the exportation of logs. Forest Management Contract area "P" is still endowed with significant areas of forests of high commercial value that can sustain commercial and non commercial extraction activities as well as community based forestry activities. The inventory data revealed the existence of primary and secondary species for both domestic and export markets in Forest Management Contract area "P". They include Afzelia spp.(Bella) (Doussie/Azoudou/Apa), Brachystegia leonensis (Naga/Akume/Meblo/Tebako), Canariun schweinfurthii (Aiele/Canarium), Entandrophragma angolense (Edinam/Tiama), Gilbertiodendron preussii (Limbali), Halea ciliate (Abura), Lophira alata (Azobe/Ekki/Ironwood), Lovoa trichiliodes (Lovoa/Dibetou/African Walnut), Nauclea diderrichii (Kusia/Bilinga/Opepe)

In addition to the above mentioned species and with the opening of Asian markets where there is strong demand for Lesser-Known Species, there exists a strong trend towards the utilization of these species. However, population of larger species of birds and mammals are in abundance on both sides of the Grand Cess/Nuch River of FMC area "P". Due to favorable habitat, the forests in FMC "P" may result into the identification of bio-diversity conservation corridor within that region.

Inventory data summary

Plot as a sample of the total forest.

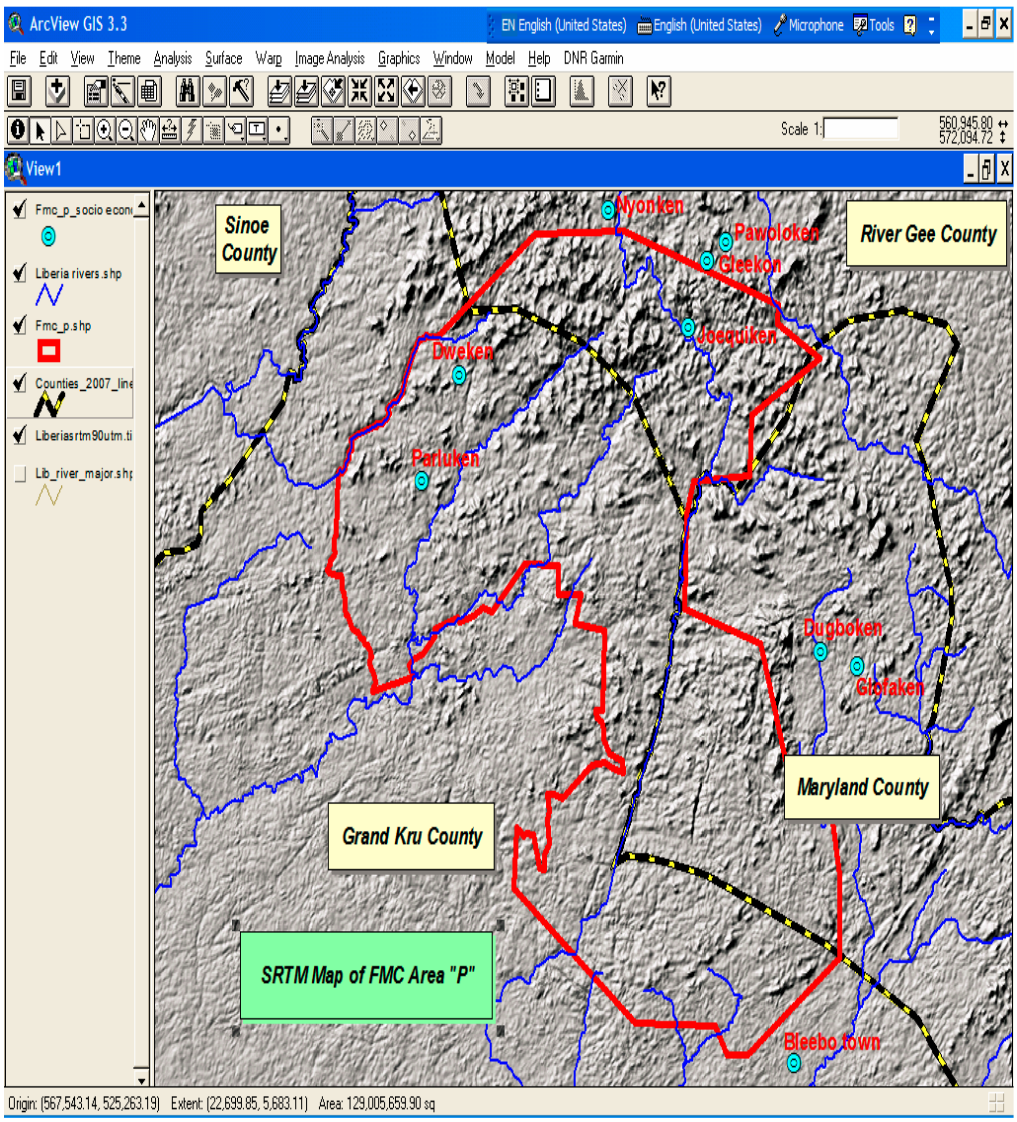
Measuring trees can be time consuming and costly operation, therefore only a sample of trees within a stand were measured by the inventory team to provide an estimate of the stand's growth (or sections of the stand's growth if different sections have been identified).

Plot Dimensions

Circular plots were used by the inventory team because it is easier to lay out in mature forest or irregularly spaced stands with low or high stocking rates where transects are poorly defined. Within FMC area "P", all plots were selectively located or, more commonly, evenly distributed throughout the area using map grid system. All plots are permanently marked on the ground and located on the field survey map.

Example of Circular plot

The system illustrated for circular plots allows trees to be easily referenced during the measurement exercise. The inventory was completed by measuring circular plots of 12 meters radius every 1,600 meters on random transects of 1.5×1.5 kilometer grid across the proposed concession area. The team measured a total of 78 plots from April to June 2008. Based on the transect and plots information the inventory team extrapolated estimates for the entire contract area. All results for this exercise are estimates.



The maximum slope recorded is 35%, however only 2.6% of the area has a slope greater than 30%. Approximately 104,694 hectares or 87.6% of the Area Pre dry land, while 14,650 hectares or 12.4% of the total area is possible wet lands, and 0 hectare or 0% of the Area Pre rocky.

Some forms of animal observation (scat, prints, call or sighting) were recorded on the plot areas.

The inventory team established 78 plots which is 3.5 hectares or 0.003% of the total area. Tree per hectare is 51.3 while the estimated total cubic meter per hectare is 371.4. The estimated volume for the inventory area in all species classes is <u>4,326,345 meters cube based on the (0.003%) forest inventory</u>.

Accessibility

- **<u>Port Facilities</u>**

Forest Management Contract area “P” is 15 miles Latitudes (North) of the Atlantic Ocean and Southeast 37 Degrees to the port of Harper, Maryland County.

- **<u>Primary Road Access</u>**

Forest Management Contract area “P” is 68 miles (108.8 kilometers) by road to the Port of Harper, Maryland County.

- **<u>Local Road Access</u>**

There is direct 360 miles or (576 kilometers) of primary and secondary motor road access to FMC area “P” from Monrovia to Gbarnga through Zwedru, but few tracks/feeder motor roads from Pawoloken, Gleekon Town comes within approximately 2.5-5.5 miles from the Northern portion of FMC area “P”. These roads would require some improvement to bring it up to an adequate standard for log transport.

The Ministry of Public Works is the organization that is in charge of the country's roads. With cooperation from the Ministry of Transport (who make the road laws), they make sure that these laws are being followed. Prospective logging company is to investigate if, and how, speed is affected by different road conditions leading to the proposed concession.

Environmental situation

Two (2) ecosystems noticed in Forest Management Contract area "P" were inland wetlands and forest. The inland wetland stretches from the North through the South of the area. These wetlands consist of large mangrove swamp, more than Seven Thousand Six Hundred (7,600) hectares. The Grand Cess/Nuch River which runs North to South of the forest empties in the North Atlantic Ocean. The inland wetlands ecosystem is mainly characterized by large streams, creeks including Si Creek and River Gbe.

The next ecosystem is the forests, which are found in abundance, forming overlapping mosaic with extensive primary forests throughout the area, especially on both sides of the Grand Cess/Nuch River and the Western portion of FMC "P" connecting to the Sapo National Park and Grand Kru and River Gee Proposed Protected Area. In general, the biological and topographical situations are unique and favorable for logging.

The field studies were carried out by teams with members from the FDA, Civil Society and the Environmental Protection Agency. Based on the Memorandum of Understanding between the EPA and FDA the joint field teams evaluated the area to determine if logging activities would have a lasting and substantial impact on the landscape and integrity of the environment. The fieldwork has provided information that if a logging company follows the general guidelines from the Code of Forest Harvesting Practices, the Forest Management Contract and the forestry regulations, there should be a minimum permanent impact and no additional special provisions that are assigned to this contract area under Part C of the Forest Management Contract.

Forest use practices

Forests within and around the Forest Management Contract area "P" is fundamental to all towns and villages visited and surveyed. The forests are the source of subsistence, economic activity and cultural identity for the rural communities and also provide medicines, construction materials, fuel, food and commodities to sell for cash.

The forests in general are of great cultural importance to nearly all Liberians. The traditional (secret) societies, that are hugely important to rural communities, conduct their rituals in certain groves and rivers within the forests. Fortunately for Forest Management Contract area "P", cultural and historic sites were not found in the 119,344 hectares of forest land.
In addition, the minute lost of forest in the Southwestern part of Forest Management Contract area "P" has been caused by two (2) factors:

- Historically, subsistence agriculture-in particular of upland rice, has been the most significant anthropogenic factor influencing forests, in the form of shifting cultivation, or slash and burn agriculture. Large areas are cleared to grow food crops for a short period, which are than left to regenerate.
- It has been the development of small roads, which also facilitates easier access for hunters and farmers. The connectivity of roads is clearly linked to forest change and fragmentation.

Timber Products	**Timber, round poles, rafters**	**From secondary forest**
Non Timber Forest Products (NTFP's)	**Rattan, bitter root, thatches, mushroom, bamboo, walnuts, bush meat, worlor, bush cherry, bush yam, bitter cola**	**From secondary forest**

Liberia has large potential water resources. The climate is of tropical type, with heavy rainfall that ranges from 2,000-4,000 mm per year. Average annual rainfall is estimated at 2,375 mm for many Counties in Southeastern Liberia. Water tables in Liberia are on average of 7-13m below ground level and easily accessible for shallow well development. Due to the war, water and sanitation remains in a state of decline, uncertainty and un-improvement. The poor water supply has resulted in communities and families drinking water from streams and creeks.

Biological situation

Forest Management Contract area "P" is known for richness in biodiversity. The rich biodiversity of the country is currently threatened by two (2) major sources. First, loss and fragmentation of habitat caused by deforestation in the East. Second, wildlife remains a critical source of protein to all Liberians, as well as a source of cash income. Animals in Forest Management Contract area "P" are killed and eaten locally, or sent raw or smoked to urban areas for sale. 25% hunting is traditionally a male activity in Forest Management Contract area "P", principally done with firearms, snares and pits, while females sell the bush meat on the road side or market places. In some cases, the hunting of bush meat has reached the status of a cash crop and forest dwellers completely abandon agriculture in favor of hunting. Few commercial hunters in surveyed towns are particularly indiscriminate, tending to favor large animals to get the biggest financial return.

Although hunting is governed by Regulation # 25, managed by the Wildlife and National Parks Division of the Forestry Development Authority, logistical reasons and a lack of implementation capacity make the implementation and enforcement of Regulation # 25 problematic.

A new Wildlife Law is being drafted to replace regulation # 25 to fulfill the requirement of the National Forestry Reform Law.

Site: Forest Management Contract area "P" – species list identified by the team or community in the area

Name of fauna / species	Type of observation	Community observation
Red colobus monkey	Common	-
Parrots	Common	-
Hawk	Common	-
Horn bills	Common	-
Forest buffalo	Common	-
Water duiker	Common	-
White antelope	Common	-
Bats	Common	-
Squirrels	Common	-
Rattle (yellow snake)	Common	-
Cobra	Common	-
Turtle	Common	-
Porcupine	Common	-
Crocodile	Common	-
Elephant	**Common**	-

Analysis and Recommendations

Logging feasibility assessment

ARL do hereby confirm that Forest Management Contract area "P" is capable for production of wood and non-wood forest products. Such production could only be sustained in the long run if it is economically and financially viable. The forests earmarked for timber production are able to fulfill a number of other important forest functions, such as environmental protection, and ecosystems. These multiple roles of the forest should be safeguarded on the part of the logging company by the application of sound management practices that maintain the potential of the forest resource to yield the full range of benefits to the community and Liberians at large.

All forestry operations in Forest Management Contract area "P" would be carried out according to high standards (planning, control procedures, and harvesting guidelines). These include pre-felling inventories for assessing the condition of logged-over forests and the types of silvicultural treatments required, harvesting procedures to reduce damage to the forest ecosystem.
However, the area is feasible for commercial logging due to the terrain, topology, and forest composition.

Social Agreement Status

Community and indigenous people's rights are vital at all levels of forestry operations to ensure transparency and accountability in forest management, development and that all interests and concerns are taken into account.

The Superintendent, District Commissioners, Town Chiefs, Clan Chiefs, Women Leaders Elders, and Youth Leaders agreed in principle that the Forestry Development Authority move immediately in tendering 119,344 hectares, Forest Management Contract area "P" for competitive bidding. Those officials include: Honorable Roseline T. Snoh, J. Karku Sampson, Seah T. Neufville, Commissioners Amos R. Nyeka, Snr., George Baryeah, Jerry W. Weah, Fred H. Bartoe, T. Barfeh Weah, J. Klayplah Chea, Warford Weadatu, Snr., Paramount Chief Toe Poe, Sampson B. Doe, James W. Doe, Johnson C. Weah, Isaac K. Weah, Robert T. Tweh, Johnson Dioh, Snr., Clan Chief Willie Q. Wah, Doe W. Nyeneh, Doe Weah, Jerome J. Jolofleh, Thomas B. Teah, Gabriel T. Swen, Joseph N. Toe, Snr., and Peter S. Wuo.

The Social Agreement should contain at least the following items based on the survey work:

- Forest areas important for cultural, agricultural, or timber and non-timber forest products collection.
- Determine and map if there are no-go zones in the forest.
- Vehicle and log transportation movement issues
- Tenure issues
- Conflict mitigation process
- What is the format of the working relationship
- Expectations for community – school, clinic, road, bridges, water and sanitation, employment.

However it is recommended that the FDA work with community, NGO and industry representatives to develop further an actual format for the Social Agreement.

Recommendations

Relevant stakeholders have assessed the data and developed this document to explain pros and cons of developing, advertising and awarding a Forest Management Contract in this area. The stakeholders have developed the following recommendations based on the field inventory and social studies.

- The Forest Management Contract area “P” is sufficiently rich in species and volume of timber to be developed as a Forest Management Contract
- The area does not have existing statutory land tenure claims; however the forest area is communally managed. The communities have submitted letters attesting that they would like a logging contract in the area.
- The FDA must work with communities and industry to facilitate an appropriate Social Agreement that takes into account community benefits, current timber and non-timber forest products, and cultural needs in the forest area.
- There are not additional adverse environmental issues identified that need to be addressed and managed under Special Provisions, Section C in the contract, beyond the need to follow the forestry law, regulations, code of forest harvesting practices and the terms of the contract.

Management Objectives, Strategies, and Indicators

The Liberia Code of Forest Harvesting Practice establishes principles for conducting forest management activities that are mandatory on all Forest Concession land and provide the framework for objectives and strategies in this Forest Management Plan.

Management Objectives and Strategies

Objective 1. Forest management practices will be designed and conducted to conserve and enhance the health and natural diversity of Area P forest ecosystems.

Landscape Level Strategy:

- Current condition of forest community groups in THE FORESTlands has been determined from the Ecological Landscape Analysis of affected communities they intersect. A comparison of current versus natural condition of these community groups will be the basis of the landscape level strategy for restoring the range of local natural variability.

- Levels of management intensity for the THE FORESTlands have been identified. These zones include:
    - Forest conservation reserves: designated, and proposed, protected areas where no forest management activity will occur (existing and proposed parks and protected areas).
    - Extensively managed forest: lands managed for multiple values using ecosystem based techniques that conserve biodiversity and natural ecosystem condition and

processes (remaining area that are not existing and proposed parks and protected areas).

- Intensively managed forest: lands managed to optimize resource production from sites but maintained in a forest state (intensive management areas have not been determined at this time).

Where extensively and intensively forest intersect conservation planning units, identified in "A Conceptual Plan for Western Area P", resource management activities will align with conservation requirement such as specific project locations, level of activity and seasonal restrictions.

- Harvest and silviculture prescriptions in the extensive management zone will be guided by the objective to sustain ecological functions in various affected communities they intersect.

- Offsite and exotic tree species will not be used for reforestation and stand conversion in the extensive and conservation zones. Future management interventions will be designed to eliminate offsite and exotic tree species where they currently exist in Area P.

- Harvesting techniques will promote vegetation types characteristic of the Forest harvestable portion of Area P.

Stand Level Strategy:

- Standard Operating Procedures (SOPs) for harvest and silviculture planning require prescriptions that:
  a) Consider landscape level objectives to restore natural variability of community groups.
  b) Consider values associated with planning units defined "A Conceptual Plan for Western Area P" developed through the Guidelines for Forest Management in Liberia.
  c) Mimic natural disturbance and sustain natural ecosystems structure and function.
  d) Promote natural regeneration of native species typical of the ecosystem.
  e) Maintain or restore species diversity by using the Code of Forest Harvesting Practices (CFHP) to guide forest management prescriptions to reach appropriate species composition in extensively managed forests with consideration of management objective to reduce clearcutting.

- While natural disturbance regimes and vegetation types are the basis of harvest and silviculture prescriptions, the risk of blow-down and potential for species in the current stand to develop into the natural vegetation type through selection harvesting are also considered.

- On sites where the natural vegetation type has been significantly altered as a result of past forest management, measures will be taken during the next scheduled intervention to facilitate the restoration of the site to an appropriate vegetation type.

Indicators

- Percent of total area designated in each of three landscape ecological management zones: forest conservation reserve, extensively managed forest, and intensively managed forests.

- Percent of harvest and silviculture operations in compliance with specifications for prescription as spelled out in the Code of Forest Harvesting Practices (CFHP)

Monitoring and Reporting:

- Percent of areas in each zone will be reviewed every five years in conjunction with the update of the 25 Year Forest Management Plan.

- Compliance with SOPs and other regulations is verified through compliance checks on all operations and an internal audit of Forest Management Plan requirements. Results of compliance checks are reported monthly, results of internal audit and summary of compliance checks is reported annually at Management Review.

- Regeneration surveys are completed on all harvest areas within three years of the harvest. Results of regeneration surveys are compiled and reported annually at Management Review.

Objective 2: Forest management practices will be conducted according to the Ecological Land Classification system for Area P.

Landscape Level Strategy

- Contract Area P lie within the area that is concentrated on the accessibility of roads and the port within the range of one hundred and seventy five (175) miles radius from Monrovia, with over sampling in Salayea and Gou-Wolliah Districts, Damai clan, Wololia clan, Upper Dinah clan, Upper Damai clan, Gbarlien clan, Palama clan, Gou-Wolliah and kpelleh chiefdoms. Gbarpolu and Lofa Counties, so that separate estimates could be produced in Forest Management Contract area "P". The landscape spatial structure, natural disturbances processes and forest composition inherent to these ecological planning units will be used to guide forest management activities.

Stand Level Strategy

- Areas planned for harvest, will have its AOP assessment prepared that describes site and forest condition.

- SOPs developed for planning harvest operations require the use of the Forest Management Planning Guidelines in determining appropriate prescriptions.

Indicator

- The percent of harvesting operations will follow the Forest Management Planning Guidelines and treatment prescription developed based on the CFHP.

Monitoring and Reporting

- Compliance verified through the Integrated Resource Management approval process.

Objective 3: Forest management practices will recognize the contribution of protected and wilderness areas in preserving the natural forest heritage within Area P.

Stand Level Strategy

- SOPs for planning road location require consideration for minimizing conservation impacts in areas adjacent to boundaries of Protected Areas and parks.

- Legally designated protected areas will be classified as forest conservation zones.

Indicator

- Percent of roads, in areas adjacent to boundaries of Protected Areas and parks, in locations that minimize conservation impacts.

- Percent of legally designated protected areas classified as forest conservation zones.

Monitoring and Reporting

- Compliance with requirements of SOPs for planning road location will be verified through compliance checks on road construction operations. Results of the internal audit and a summary of compliance checks will reported annually at Management Review.

- List of legally designated protected areas.

Objective 4: Forest management practice will be designed and conducted in a manner that maintains and enhances the quality of air, soil and water.

Landscape Level Strategy

- SOPs for planning roads require measures be taken to avoid wetlands, watercourses and areas where depth to water table and soil type create increased risk of soil damage.

- No more than 25% of a designated water supply area to be in a state of recent (5 years or less) forest timber harvest except under circumstances where harvesting is prescribed to salvage wood from areas damaged by natural disturbance

- Forest Management in designated municipal water supplies will comply with Source Water Protection Plans designed to protect water supplies as developed by the water authority.

- Road densities will be minimized through strategic planning of new and temporary access, road decommissioning, and timber harvest scheduling.

Stand Level Strategy:

- Specifications for biomass harvest, included in SOP for harvest operations, require minimum retention levels depending on site productivity.

- Measures to be taken to minimize soil disturbance on all harvest operations involving off - road equipment including the requirement to comply with guidelines established are documented in SOPs for operation of off-road equipment.

- SOPs for location and development of roads, landings and borrow pits include measures to be taken to minimize the area taken out of forest production.

Indicators

- Percent of roads and trails established that meet the requirement of the SOPs for planning road location.

- Percent of harvest and silviculture operations in compliance with measures to minimize soil disturbance.

- Percent of roads, landings and borrow pits that meet the requirements of relevant SOPs.

Monitoring and Reporting

- Compliance with requirements of SOPs for planning road and skid trail layout will be verified and reported through an annual internal audit of management plan requirements and reported annually at Management Review.

- Results of compliance checks on road building are reported regularly, results of the internal audit and a summary of compliance checks will be reported annually at Management Review.

Objective 5: Forest management will be designed and conducted with consideration of potential effects of climate change and opportunities to maintain and enhance carbon sinks

Landscape Level Strategy

- Forest management activities will increase carbon sequestration through:
  a) Measures taken to ensure all harvested areas meet minimum standards for stocking of acceptable species.
  b) The use of genetically improved, faster growing seedlings on all planting operations.
  c) Minimum retention requirements on all harvest operations
  d) Designation of management zones where harvesting will be restricted or prohibited.
  e) Conservation of wetlands

- Species listed as acceptable growing stock will include natural species diversity.

- Road construction and bridge and culvert installation and partial harvest specifications will account for the predicted increase in extreme weather events.

- Forest monitoring programs have been implemented to detect outbreaks of pests and pathogens.

- Harvest and silviculture prescriptions based on Forest Management Guideline will promote the establishment a natural range of species resulting in forests that are more adaptable to changing climate.

Indicators

- Percent of harvested areas adequately stocked with acceptable species through natural regeneration.
- Percent of roads, bridges, culverts and partial harvest operations that meet specifications defined in SOPs.
- Number of instances of pest or pathogen infestation identified.

Monitoring and Reporting

- Results of natural regeneration surveys to be reported annually at Management Review
- Compliance with specifications for road construction, bridge and culvert installation and harvest prescriptions will be verified with compliance checks and an annual internal audit of management plan requirements. Results of compliance checks will be reported quarterly, annual through the internal audit and summary of compliance checks will be reported annually at Management Review.

Objective 6: Forest management practices will be designed and conducted to secure a long-term sustainable harvest of forest products.

Strategy: Timber Harvest

- Sustainable harvest levels are determined using a Woodstock Forest Development Model based on current forest conditions, expected response to silviculture treatments and restrictions in place to ensure non-timber objectives are met. The average annual harvest for each five year peiord is included in Table 2. The area proposed as the Mi'kmaw Forestry Initiative is not included in the wood supply analysis. Method of harvest and area of silviculture treatment is shown in Table 3.

Table 2

AVERAGE ANNUAL HARVEST FROM SSR/SMB/NM LANDS 2013-2037

Period	Average Annual Softwood Harvest (tonnes)	Average Annual Hardwood Harvest (tonnes)	Average Annual Total Harvest (tonnes)
2009-2014	97,719	20,157	117,876
2015-2020	97,719	20,157	117,876
2021-2026	97,719	20,157	117,876
2027-2032	97,719	20,157	117,876
2033-2037	97,719	20,157	117,876

Table 3

AREA HARVESTED BY HARVEST METHOD AND AREA OF regenerationTREATMENT

Period	Mosaic Harvest (hectares)	Variable Retention (hectares)	Selection (hectares)	Pine Seed Tree (ha)	Commercial Thinning (ha)	Plant (ha)	PCT (ha)
2013-2017	6,790	188	370	172	379	524	1,621
2018-2022	7,765	19	482	0	92	629	1,945
2023-2027	6,091	3	66	172	0	688	2,334
2028-2032	5,633	0	43	0	83	550	2,800
2033-2037	6,244	234	255	51	329	440	3,080

MANAGEMENT OF THE NATURAL ENVIRONMENT

Forest Contract Area P provides a variety of ecological functions and benefits ranging from the provision of wildlife habitat to the cycling of nutrients and water. Atlantic Resources seeks to "*Protect the ecological features and values of Forest Contract Area P".*

Four objectives are identified in the Alpha for the attainment of this objective:

1) Identify and describe Forest Contract Area P ecosystems and their functions.

2) Identify the challenges and opportunities to cooperate with traditional users.

3) Identify areas for research and study.

4) Identify and describe requirements for protection (e.g. removal of alien species) including exclusion from other uses.

This forest management plan identifies the following objectives in support of the

Atlantic Resources direction. These objectives are as follows:

1. To conserve and enhance biological diversity of Forest Contract Area P.

2. To maintain and/or enhance wildlife habitats by the application of appropriate forest management.

3. To ensure no loss of threatened, endangered, rare or vulnerable species habitat (plant or wildlife) as a result of forest management activities.

4. To ensure forest management interventions minimize adverse effects on soils, water, vegetation fish and wildlife and other identified values.

5. To maintain wildlife populations at levels which provide for species continuance and provide opportunities for wildlife harvesting, aesthetic appreciation, and education and scientific investigations.

6. To minimize environmental damage to the natural resources of Forest Contract Area P and prevent personal injury or loss of life and which may arise from natural disturbance events such as wildfire or from human activities.

The following strategies will be implemented to maintain or enhance the environmental integrity of Forest Contract Area P during the twenty-year management period:

- Areas of productive forest land classified as Protection Forest Reserve or Ecological Reserve will be exempt from forest management activities.

- The Forest Manager will, in collaboration with LFAC and interested members of the public, develop/adopt a code of best practice for forest and wildlife management.

- Timber and non-timber forest values will be protected and enhanced through appropriate and timely management practices.

- There will be no loss of threatened, endangered, rare or vulnerable species habitat (plant or wildlife).

- Candidate areas of "Proposed Old Growth Reserves" will be retained in Forest Contract Area P.

- Specific management targets for restoring uncommon vegetation types (within the context of historic distributions in eastern Ontario and regional forest landscape) will be established in stand level management prescriptions.

- Invasive exotic species will be monitored in conjunction with normal forest management activities and practical control measures implemented as required.

- All wildfires will be actively suppressed and management actions to reduce fire risk will be undertaken on an as needed basis.

- Insect and disease outbreaks will be controlled as required. Integrated pest management approaches will be utilized where practical.

- Roads, water crossings and access trails will be constructed and maintained to minimize impacts to the forest site and other values (i.e. natural heritage values, water courses etc.) in accordance with local best management practices and provincial guidelines.

- Site inspections will be completed for all areas designated as eligible for harvest to determine the presence of natural or heritage values and the protection of identified values as required through the application of area of concern prescriptions. In the absence of specific values information provincial forest management guidelines and current wildlife habitat guidelines will be used to guide timber management planning.

- Forest management operations will be limited to times of the year when the soil is frozen on susceptible sites.

- Signs will be posted restricting motorized trail use when soils are excessively wet. Physical barriers will be used in instances where requests for voluntary compliance do not prove adequate.

- Logging slash and debris will be retained on nutrient poor sites. Full tree logging systems will not be used in lower site class stands.

- The Area of Concern digital layer for natural and cultural heritage values will be maintained and updated (as appropriate) in the LF database.

- Habitat features desirable to wildlife will be preserved where feasible and appropriate.

- Forest operations will be conducted in a manner consistent with prescribed wildlife management objectives, provincial wildlife management guidelines and the protection of rare, threatened or venerable species and their habitat.

- Wildlife habitat improvement programs and initiatives (i.e. water impoundment projects) with community groups and partner organizations will be fostered and promoted.

Area of Concern Management Guidelines

An area of concern (AOC) is an Area Pdjacent to a site of identified value that may be affected by some or all aspects of planned forest management activities. Areas of Concern include wildlife habitats, fragile soils and riparian ecosystems.

The following sections outline management strategies and guidelines for the maintenance and protection of Forest Contract Area P's natural and cultural heritage values. These guidelines are in accordance with existing forest management guidelines and local best management practices. AOC management practices will be updated and revised as new forest Management guidelines become available during the management period.

An area of concern data layer has been constructed in the GIS as a component of the management planning process. The maintenance and updating of this digital layer will be an annual requirement for effective forest management.

WETLANDS

Two (2) ecosystems noticed in Forest Management Contract area "P" were inland wetlands and forest. The inland wetland stretches from the North through the South of the area. These wetlands consist of small mangrove swamp, less than Five Thousand (5000) hectares. The Via River which runs not too parallel to the Keya creek empties in the Saint Paul River. The inland wetlands ecosystem is mainly characterized by streams, creeks, raphia palm, bamboons and mitragyna species.

The next ecosystem is the forests, which are found in abundance, forming overlapping mosaic with primary and secondary forests throughout the area, especially in the South Western portions of the boundary limit. In general, the biological and topographical situations are unique and favorable for logging.

The field studies were carried out by teams with members from the FDA, Civil Society and the Environmental Protection Agency. Based on the Memorandum of Understanding between the EPA and FDA the joint field teams evaluated the area to determine if logging activities would have a lasting and substantial impact on the landscape and integrity of the environment. The fieldwork has provided information that if a logging company follows the general guidelines from the Code of Harvesting Practices, the Forest Management Contract and the forestry regulations, there should be a minimum permanent impact and no additional special provisions that are assigned to this contract area under Part C of the Forest Management Contract.

RIPARIAN ZONE MANAGEMENT

Stream banks and the areas adjacent to Contract Area P wetlands, swamps and bogs constitute important wildlife habitats. Forestry and recreational development in or adjacent to these areas which may result in the deterioration and/or physical alteration of the riparian zone are discouraged.

Timber management activities in riparian ecosystems will maintain and enhance the riparian zone's ability to achieve the stated objectives, and must be conducted in a manner which minimizes ground disturbance.

Large-sized, standing and downed dead and dying trees are important habitat components for many wildlife species. Effort will be made to maintain these features in riparian buffer zones where there availability may be limited in adjacent stands. The retention of snags in riparian areas will supplement the number of snags available for cavity dependent species and will preserve potential nest sites for raptors. The retention of large trees near streams and wetland areas will also function to provide a short and long-term supply of fine and coarse woody debris to the water. The application of this strategy will not affect buffer zone widths beyond its influence on buffer stability.

Streams and creeks will be protected in accordance with the *Timber Management Guidelines for the Protection of Fish Habitat.* These guidelines recommend reserve sizes which are slope dependent ranging from 30 m to 90 m.

Wetlands that support forest stands (generally Niangon, green and black ash) will be protected through the application of the appropriate silvicultural ground rules for each species and site condition. Non-provincially significant wetlands that do not support forest stands will be protected by a 30 m modified harvest zone.

Equipment will not be permitted within the zone unless the soil is frozen.

Harvest operations in the vicinity of vernal pools (surface area > 200 m^2) seepages and intermittent streams will retain crown closure (50-75%) and be conducted in a manner which ensures that felled material is not deposited in the pool. Harvesting is not to be permitted near the edge of vernal pools.

The application of these riparian management strategies will satisfy the following goals: (1) the maintenance of aquatic integrity; (2) the maintenance of riparian ecological diversity; (3) the maintenance of landscape connectivity; (4) the protection of recreation resources; and (5) the assurance of wood production on a sustainable basis in a manner compatible with the management of other resources and values.

MANAGEMENT OF CULTURAL AREAS OF CONCERN

First Nation cultural and traditional values are often identified within the context of forest management plan development as areas requiring special protection and/or management considerations. Identified areas (e.g. medicinal plant gathering sites, traditional hunting areas) are typically set aside and protected from forest operations and detrimental recreational use through policies such as harvest/recreational use exclusion and/or the establishment of modified use or harvest strategies. First Nations values information had not been documented in past plans for Forest Contract Area P.

For Forested land, the Native Values Collection process is the responsibility of the Forestry Development Authority for Timber Management requires that Native values identified in the forest management planning process be protected. While no similar obligation exists for

forest management on private lands, the Forestry Development Authority addresses the legal and customary rights of indigenous peoples related to the use and management of forest lands.

SOIL PROTECTION

Wide scale problems of soil erosion and/or compaction or rutting currently do not occur in Forest Contract Area P. The degree of compaction related to forestry activities and/or motorized recreation is related to a number of factors including the presence and amount of soil organic material, the nature of ground vegetation and root network, soil texture and soil moisture, machinery type and the number of machine passes over a given area.

The objective in implementing the management plan will be to minimize impacts on soil arising from forestry operations and recreational activities. Strategies to minimize soil compaction and rutting will include:

1. Limiting forest operations on susceptible sites (i.e. organic soils, poor drainage) to times of the year when the soil is frozen.

2. Selection of harvesting equipment and methods to reduce ground-bearing pressure.

3. Skid trail layout which confines skidding operations to set network of trails and minimizes the distances traversed.

4. Restrictions on motorized recreational trail use when soils are excessively wet and/or designating trail seasonal use.

Table 30 provides guidelines related to soil compaction in partial cutting harvest operations in the Code of Forest Harvesting Practices which have been developed by the Forestry Development Authority. It is recommended that these standards be adopted for operations in Forest Contract Area P. When compaction on a skid trail exceeds the guideline, the trail will be closed until rehabilitation takes place or weather conditions allow the continued use of the trail without further compaction. No new trails will be created to compensate for damaged trails that exceed the guideline.

Table 30. Site Impact Guidelines[19]

Skid Trail Category	Maximum Distance of Compaction per Skid Trail	Maximum Distance of Compaction Per Landing	Operational Status
Minor – 15 cm or less compaction	Can be maintained over the length of the trail.	Can be maintained over the entire system of main skid trails.	None
Moderate – 16 cm to 30 cm of compaction	Can be maintained over the length of the trail.	Can be maintained over the entire system of main skid trails.	None
Major – 31 cm to 60 cm of compaction	120 m	480 m	If the maximum distance is greater than 120 m cease operations on an individual trail.

			This may include up to 30 m of extreme compaction for an individual trail. If maximum distance is greater than 480 m, cease operations on the landing. This may include up to 120 m of extreme compaction for a landing.
Extreme – compaction greater than 61 cm.	30 m	120 m	If the maximum distance is greater than 30 m, cease operations on an individual trail. If maximum distance is greater than 120 m, cease operations on the landing.

Soil erosion will be minimized by good planning and layout of trails. Water bars will be used to minimize erosion during operations as required.

Site Nutrient Management

Nutrients enter forest ecosystems primarily through rainfall and the decomposition of soil and rock and leave the forest by leaching, harvesting and some volatilization. Differences in a regional basis are marked due to differences in climate and geologic history. The topic of nutrient cycling in ecosystems is broad and complex and complicated by our imperfect knowledge of nutrient fixation rates, weathering and mineralization of organic matter in forest ecosystems, and tree species nutritional needs. Our current understanding of nutrient cycling in forested ecosystems and the silvicultural and management implications of nutrient cycling suggests that;

- The ecological consequences of timber removals vary for different nutrients according to species, stand density, stand age and site quality as these parameters determine the relative proportions of stem biomass and consequently, the difference in nutrient withdrawals between harvesting techniques.

- Our current knowledge of nutrient fixation rates, weathering and mineralization of organic matter in forest ecosystems, as well as species nutritional needs is fragmentary, making conclusions as to the effect of harvesting on nutrient removals rudimentary (Alban et al., 1978).

- Full-tree harvesting puts more stress on the nutrient pools and the structure and functioning of cycling pathways in forest ecosystems, however, the overall ecological significance, duration and long-term implications of these stresses is less clear.

- Mixedwood site types typically demonstrate shorter nutrient replacement times and are likely less vulnerable to nutrient depletions.

- Harvesting impacts on nutrient pools appear to be greatest on soils that are poorly drained or shallow. Evidence suggests that complete tree removal on such sites can be expected to diminish available forms of nutrients and extend nutrient replacement times.

- It is generally not known if nutrient depletion arising from the removal of forest trees is critical, or is instead balanced by the influx of new nutrients from bedrock weathering or atmospheric deposition. Research to date indicates that the number of years needed to replace nutrient removals by annual inputs from precipitation and weathering is usually less that the harvest cycle for conventional harvests. Inputs from weathering however are expected to be slight in soils which are poorly drained or shallow over bedrock where water residence time may be short. Repeated harvests at time periods shorter that those required to regain pre-cut nutrient levels on these sites can amplify ecosystem deterioration.

- In general conifer species better exploit soils with poor structures and nutrients in mineralized forms than hardwood species due to the large size of conifer fine roots.

Timber harvesting operations and site preparation can reduce nutrients by causing them to be leached, volatized in the case of fire, or taken from the site during harvest. The following strategies will be implemented to reduce nutrient losses in Forest Contract Area P:

- Environmentally sensitive sites (i.e. shallow and/or wet soils) identified in the forest inventory are removed from the productive forest land base and excluded from the calculation of the allowable cut since harvesting on these sites appears to diminish available forms of nutrients and extend nutrient replacement times.

- The retention of logging slash and residues on poor sites (site class 3 stands) is recommended. This debris will act as a nutrient sink from which nutrients gradually become available to the system through the process of decomposition.

- The use of full tree harvest systems will be limited (where economically feasible) to site class 1 and 2 stands.

- Site preparation techniques that mix organic materials with surface mineral soil will be favoured over treatments that remove slash and humus.

Harvest operations will retain stand vertical structure where possible and appropriate.

Guidelines for Site Protection During Forest Management Operations

Under some site conditions, the use of certain practices or equipment during timber management operations has a greater potential to cause negative or undesirable environmental impacts such as compaction, rutting, loss of nutrient capital, disruption of lateral water flow, loss of surface organic matter and erosion. The magnitude and duration of these impacts will vary with the nature and timing of the activity, site conditions, and the cumulative effects of adjacent land uses. The following sections outline management standards and practices to be adopted in Forest Contract Area P to mitigate unwanted negative impacts arising from forest management operations.

LOGGING DAMAGE

Operator training, good judgment, and care in the conduct of harvesting, and other forestry activities will mitigate negative site impacts of planned operations. Typically, logging damage to the stems and roots of residual trees increases with the size of the skidding equipment and the length of the load.

Table 33 presents stand level damage standards for partial harvesting systems in hardwood forests to be adopted for operations in Forest Contract Area P.

Table 33. Stand Level Damage Standards for Partial Harvesting Systems

Damage Type	Standard
Damage to Residual Stems	After harvesting 85% of the residual basal area (10+ cm) should be free of major damage and 90% of the residual acceptable growing stock should be free of major damage. Incidence of damage should not be concentrated in any one size class.
Damage to Regeneration	Minimum stocking and density regeneration standards as detailed in the silvicultural ground rules must be maintained following release operations (i.e. removal cuts in shelterwood harvest systems).
Skid Trail Coverage	A minimum of 70% of the ground area in uniform shelterwood areas and 80% in selection cut areas is to be skid trail free.

Source: A Harvesting Guide for the Tolerant Hardwood Forest (1998)

LOSSES OF PRODUCTIVE FOREST LAND

Landings, skid trails, and slash piles diminish productive forest area. Area losses will be minimized through the application of management practices, which maximize skid trails, minimize the area designated to landing areas, and reduce slash pile areas by burning or scattering.

LOGGING SLASH

Logging slash should be lopped so that it lies near to the ground and, if possible, spread evenly over the cut area. These practices serve to speed up decomposition, reduce soil nutrient losses and enhance the survival of tree seedlings by protecting them against extremes in temperature and moisture.

SKID TRAIL LAYOUT

Skid trail layout and location must be addressed within the context of annual cut plans to minimize site damage. Effort should be made to both minimize distances traversed and the number of trails required. Standards for skid trail coverage are provided in Table 33. The existing extensive network of roads and trails within Forest Contract Area P should minimize the number of new trails that need to be developed.

ROAD LOCATION & WATER CROSSINGS

All road and water crossings must conform to current provincial regulations. The development of a GIS-based water crossings inventory is recommended during the first five

year operating period. Monitoring of water crossings to mitigate the likelihood of washouts should be undertaken between periods of active road use.

6.6. Wildlife Management

The application of silviculture within a forest stand will affect the diversity and stability of the forest ecosystem, and therefore directly influence the ability of a forest stand to support and/or maintain wildlife populations. Forestry operations have both beneficial and detrimental impacts on habitat quality and quantity depending on the habitat, and/or the food and shelter requirements of the species affected. It is must also be recognized that harvest impacts vary both spatially and temporally over the landscape. Throughout the timber rotation, both timber and wildlife objectives may be realized to the mutual satisfaction of all resource users.

Silvicultural systems (shelterwood or clear cutting) that yield sapling size stems of intolerant species are preferred in terms of upland game or ungulate production provided adequate areas of winter cover are maintained. Selection cutting systems generally produce more limited wildlife habitat as a balanced diameter distribution and relatively even regeneration to shade tolerant species is maintained. Although the dietary diversity available to herbivores is diminished with the perpetuation of the climax forest, selection cutting is considered beneficial to other wildlife species such as terrestrial furbearers and non-game birds. The maintenance of cull timber in selection harvest systems for nesting, denning or perching sites is also desirable.

The detrimental impacts of harvesting may include fragmentation of the forest which results in a reduction in food, cover and/or nesting/denning sites, increased erosion and soil compaction, ecosystem simplification, etc.

The habitat diversity of a forest can be measured both horizontally (i.e. the spatial pattern of habitats over an area) and vertically (i.e. the number of vertical strata in the forest). The diversity of the forest, with respect to a particular species, depends upon the scale at which it is viewed by that species (Hunter, 1990). Different animal species have different requirements for habitat diversity; some can live in a variety of habitats, some require a diverse habitat, some require a uniform habitat. For species with small home ranges, a mature forest with many gaps may represent a spatially diverse habitat. Diversity of species with larger home ranges however, may be a mosaic of stands of varying ages and species composition (Hunter, 1990). The forest that results from timber harvesting will not be the same as the forest that existed prior to harvest; there will be a change in density and species composition after harvesting. It is generally not possible to accommodate the needs of all wildlife species in an area following a disturbance due to the habitat requirements of each species.

Wildlife species can for the most part adapt to disturbances created by timber management activities provided that the pattern of harvesting mimics natural events as much as possible (Arnup et al. 1988, Thompson and Welsh, 1993). In the years immediately following traditional clear cutting vertical habitat diversity is almost non-existent, as the overstorey is completely removed. The reduction of vertical diversity is not as significant in silvicultural systems which retain standing timber (i.e. selection, shelterwood systems).

Horizontal habitat diversity will vary as a function of the size and arrangement of cuts. As a general rule, timber management that creates forest fragments smaller than a species home range will result in a reduction in abundance of that species (Boyle, 1991). Several authors now advocate using a range of harvest patterns, including large clear cuts to create landscape-level diversity. Patch cuts or small clear cuts can be used to create a mosaic of stands of different ages and species composition creating mid-scale diversity.

Shelterwood harvesting generally produces more vertical diversity through the retention of standing trees until the final cut. The retention of trees suitable for cavity nesting birds and other animals will provide in-stand structural diversity.

The horizontal diversity of habitats in shelterwood harvest areas is dependent on the size and arrangement of cut and uncut areas.

Selection cutting creates discontinuities in tree size (or groups of trees) and thus ensures that there will be trees of many different ages in a stand. Both group and individual tree selection cause fine scale disturbance, so stand level vertical structure is usually high edge and fragmentation effects are often low, and stand heterogeneity is high relative to clear cut or patch cut stands. Single tree selection allows for the greatest vertical diversity as it provides more canopy layers than other harvesting systems. Group selection lessens the continuity of vertical habitat, but increases the horizontal diversity; there is more understorey vegetation, fewer openings and plant growth is more clumped. An even distribution of low understorey vegetation results from individual tree selection which should generally support low but constant populations of terrestrial wildlife.

WILDLIFE MANAGEMENT OBJECTIVE

The wildlife management objective for Forest Contract Area P is

"*To maintain wildlife populations at levels which provide for species continuance and provide opportunities for wildlife harvesting, aesthetic appreciation (e.g. bird watching), and education and scientific investigation"*.

WILDLIFE MANAGEMENT STRATEGIES

This objective will be achieved through the attainment of the following strategies:

- A diversity of forest cover types and stand structures will be maintained to provide a diversity of wildlife habitats.

- The mandatory application of provincial guidelines for wildlife management (where appropriate) in forest management planning and operations.

- There will be no loss of threatened, endangered, rare or vulnerable species habitat (plant or wildlife).

- Habitat features desirable to wildlife will be preserved where feasible and appropriate.

- Forest operations will be conducted in a manner consistent with prescribed wildlife management objectives, provincial wildlife management guidelines and the protection of rare, threatened or vulnerable species and their habitat.

- A values layer which contains information on wildlife values will be maintained in the LF database.

- Wildlife habitat improvement programs and initiatives (i.e. water impoundment projects) with community groups and partner organizations will be fostered and promoted.

Wildlife Management Guidelines

The protection of wildlife values will be addressed during forest management planning and operations by the mandatory application of forest management guides (where appropriate) developed by the OMNR. Forest management activities will be conducted in a manner consistent with planned silvicultural, area of concern, and wildlife management objectives and strategies.

The effectiveness of the provincial guide strategies and other silvicultural strategies in achieving wildlife habitat management objectives will be monitored by Enumeration staff in conjunction with the delivery of regular management activities in the Forest. The sections below present guidelines to be adopted during annual tree marking operations in Forest Contract Area P.

RECREATION & TOURISM MANAGEMENT

Forest Contract Area P is a multiple use forest with a long history of recreational use by the citizens of Lofa and Gbarpolu Counties. Public demands for the provision of recreational opportunities in Forest Contract Area P can reasonably be expected to increase over the management period with increased population growth in the United Counties and increased awareness of the Forest as a recreational area.

Recreation management issues are typically related to trail deterioration arising from overuse and/or inappropriate trail use and the desire of some hikers and other recreationalists to restrict motorized access either seasonally or permanently within some compartments. Past forest management plans did not prescribe land use designations for recreational use.

RECREATION & TOURISM MANAGEMENT

Forest Contract Area P is a multiple use forest with a long history of recreational use by the citizens of Lofa and Gbarpolu Counties. Public demands for the provision of recreational opportunities in Forest Contract Area P can reasonably be expected to increase over the management period with increased population growth in the United Counties and increased awareness of the Forest as a recreational area.

Recreation management issues are typically related to trail deterioration arising from overuse and/or inappropriate trail use and the desire of some hikers and other recreationalists to restrict motorized access either seasonally or permanently within some compartments. Past forest management plans did not prescribe land use designations for recreational use.

The LFLRP does provide management direction for recreational use through the designation of multi and single recreation use DUAs, the prescription of compatible secondary uses and general policies for recreation within all DUAs. The Long Range Plan approves recreational use within all DUAs with the exception of motorized recreation within ecological protection areas. Specific recreational activities may be restricted or limited in Forest Contract Area P in instances where public safety and well-being is a concern.

Recreational activities occurring in Forest are varied and include;

- Motorized trail use

- Non-motorized trail use (hiking, horseback riding, X-country skiing, snowshoeing, mountain biking).

- Geocaching.

- Bird watching, nature photography and observation.

- Hunting.

Such passive uses of Forest Contract Area P are entirely appropriate and should be promoted. Most activities are compatible and/or accommodated (i.e. shared non-motorized and motorized trail use).

Seasonal restrictions (e.g. no motorized vehicle use on trails during the spring thaw, no permanent tree stands for deer hunting) are posted on signs at the trailheads, in parking and staging areas and on occasion in local media. Compliance is voluntary and access roads and trails are not regularly monitored for incidences of non-compliance with the posted directives. The Forest Manager and members of the Recreation subcommittee are of the opinion that additional measures to control recreation use and access by physical barricades (such as gates, ditches, berms and rock piles) are not currently warranted.

Recreation & Tourism Management Objectives and Strategies

FDA and other stakeholders has recognized the growing significance of recreational use in Forest Contract Area P and the importance of establishing recreational use policies within the broader context of a forest management policy framework for Forest Contract Area P. The provision of a range of quality recreational and outdoor educational opportunities is a significant element of the LFLRP and its third objective relates specifically to recreation:

"*Provide a wide range of quality recreational opportunities in a safe environment"*.

The Atlantic Resources and Wood Processing proposes the following strategies for objective achievement:

1. Identify and design a recreational trail system that will meet the needs of all current and potential users.

2. Identify other (non-trail) type recreational opportunities (e.g. tobogganing, wildlife viewing, picnicking, camping).

3. Prepare a code of conduct for trail and other recreational users.

4. Continue to provide traditional recreational past practices such as hunting.

Zones of multi and single recreational use have been identified in the Atlantic Resources and Wood Processing and general management policy statements are provided. Within the context of this forest management plan the provision of a wide range of quality recreational opportunities will be accomplished through the attainment of the following objectives;

1. To maintain a diversity of forest cover types and stand structures to provide for a diversity of recreational uses.

2. To ensure that timber management activities (e.g. harvest, renewal, and maintenance) are undertaken in a manner, which eliminates or minimizes conflicts with other users of the forest.

3. To ensure that recreational uses do not degrade or adversely affect the forest, its access roads and trails or other values.

4. To promote the use of Forest Contract Area P as a public resource for forestry and natural environment education.

5. To provide a safe environment for the public use of Forest Contract Area P.

6. To maintain the road and trail network of Forest Contract Area P in sufficient condition for recreation use.

TIMBER MANAGEMENT

Integrated resource management in Forest Contract Area P will, for the most part, be achieved by the management or manipulation of forest cover, principally through the application of silvicultural strategies for forest harvest, renewal and tending.

Only lands classified as production forest (i.e. production, protection forest, and barren and scattered) will be eligible for forest management activities (2,311 ha) during the twenty year management term. These areas constitute approximately 40 % of the forested area of Forest Contract Area P. Protection forest reserve and ecological reserve lands will be excluded from active forest management[26]. The status of barren and scattered areas (188 ha) as productive or Non-Production forest lands will be determined during the first five year management term.

Timber Management Objectives and Strategies

The Forest Contract Area P Long Range Plan sets the overarching policy for resource management within Forest Contract Area P and provides overall direction and context for forest management planning. The goal of Atlantic Resourcesis to manage the Forest on a sustainable basis for a wide variety of goods and services. Objectives associated with the plan seek to;

1) Ensure that Alpha continues to provide a source of economic activity.

2) Ensure management maximizes benefits to the affected communities.

3) Ensure that a range of quality recreational opportunities are provided.

4) Ensure that ecological features and values are protected.

5) Ensure that outdoor educational opportunities are provided.

This broad goal may be realized through the attainment of the following objectives;

1. To manage the forest ecosystems of Forest Contract Area P on the basis of sustained yield and in a manner consistent with sound environmental practices.

2. To manage the natural resources of Forest Contract Area P for the benefit of the people of Lofa and Gbarpolu with due consideration of all forest users and resource values.

3. To conserve and enhance biological diversity of Forest Contract Area P.

4. To ensure no loss of threatened, endangered, rare or vulnerable species habitat (plant or wildlife) as a result of forest management activities.

5. To ensure forest management interventions minimize adverse effects on soils, water, vegetation fish and wildlife and other identified values.

6. To promote the growth of high quality timber products through the application of timely and appropriate silvicultural practices.

To control damaging agents such as fire, insects and disease

The following strategies for timber management will be implemented during the twenty-year management period.

- All stand silvicultural prescriptions for operations in Forest Contract Area P are to be prepared and certified by a Registered Professional Forester (R.P.F.) in good standing with the Ontario Professional Foresters Association.

Prescriptions are to recognize integrated resource management values.

- All tree marking activities will be carried out by "certified tree markers" in accordance with "approved marking prescriptions" prior to active operations. Property boundaries will be verified prior to the commencement of forest management activities.

- Post harvest surveys will be conducted for each harvested stand to verify residual stand structure as per the approved marking prescription and assess contractor performance (i.e. residual stand damage, compliance with AOC boundaries etc.).

- All areas designated as eligible for harvest will be inspected prior to operations to determine the presence of natural or heritage values. Appropriate measures will be implemented to protect identified values.

- Wood products will be directed towards the highest and best end use where feasible and appropriate.

- Silvicultural operations will target the improvement of growing stock within designated stands through the removal of trees of limited potential and the improvement of growing conditions (spacing) around better quality stems.

- It is recommended that external financial and human resource support be solicited to support forest management in stands that under current conditions are uneconomic to manage. This strategy could entail the acceptance of reduced stumpage payments for stand improvement operations.

- Public tendered sale of wood products will be promoted. All timber sold will be marked and tallied for diameter and product. Wood sale contracts will detail species volumes and prices, operational, safety, regulatory and other requirements as determined by Atlantic Resources. It is recommended that wood sale contracts be subject to a minimum 10% performance holdback to offset costs or charges associated with non-compliance to contracted terms and conditions and/or penalties or remedial actions related to environmental or site damage arising from harvest/hauling operations.

- It is recommended that the upgrading and updating of the forest inventory database be given a high priority in annual plans for the first five year management term.

Management of Forest Contract Area P plantations will continue to be based on the application of area wide density management diagrams augmented by the local experience and professional judgment of Alpha forestry staff

Forest Management Systems

To achieve management objectives, silvicultural techniques will necessarily vary with the nature and condition of the forest stand. Stands of inferior quality will be subject to improvement treatments to remove cull, high risk, less desirable species and poor quality growing stock where markets for funding permit.

In general, even-age and uneven-age (all-age) silvicultural systems or adaptations thereof will be utilized in conjunction with the management of the forest working groups in Forest Contract Area P.

MONITORING AND ASSESSMENT

Forest management plans are monitored to ensure compliance with the forest management plan, to determine the effectiveness of planned silviculture, to ensure that forest operations have complied with prescriptions for operations and operational restrictions, to discover problems (i.e. insect infestations, illegal dumping etc.) and to document observations of the effects of forest management and other forest uses on forest cover types and forest values.

Indicators of Forest Sustainability

Indicators are the tools for assessing the outcome of management decisions, and a guide for adaptive, knowledge- based management. Periodic assessments (five year intervals) will be made in order to determine whether Forest Contract Area P is being managed sustainability and whether other management objectives are being achieved. This forest management plan therefore, will provide the base information and data required to monitor assess and report on progress towards forest sustainability over successive planning periods.

The assessment will include a comparison of the achievement of planned vs. actual targets, an assessment of the status of sustainability indicators and the rational for any significant deviations from planned targets. The Forest Management Planning Guideline identifies five criteria for use in the determination of forest sustainability at the management unit level[33]; biodiversity, forest condition and ecosystem productivity, soil and water quality and the provision of multiple benefits to society. It is recommended that the Forest Manager, in collaboration with the FDA, develop a comprehensive suite of forest sustainability indicators appropriate to the resource attributes and uses of Forest Contract Area P (e.g. stability of forest cover types, recreational use trends, public satisfaction with forest management, value of wood products harvested etc.) during the first operating period.

Forest Operations Inspection

All forest operations will be inspected for compliance with contract specifications. The frequency of inspections will depend on the complexity of the operation, the values to protect and contractor performance in previous contracts. Prior to the commencement of silvicultural contracts it is recommended that the AL Forest Manager

meet with contractor's staff in the field to discuss site specific conditions and the importance of compliance with the silvicultural prescription.

Field Inspections should occur at least on a monthly basis with a final inspection at the end of operations prior to the departure of the contractor. During site inspections it is important to record any undesirable conditions in areas of operations that appear to be related to forest management activities (e.g. washouts, blow downs).

The minimization of damage in selection harvesting operations will be important in order to maintain suitable levels of acceptable growing stock over the cutting cycle. Logging damage surveys will be carried out to ensure minimum standards. Tree marking will be monitored prior to harvesting, to ensure that minimum standards are achieved prior to harvesting.

It is recommended that operational surveys to identify timber supply, site conditions, including ecosites and specific operational prescriptions at the stand level be carried out over the five year operational term. Hardwood stands should be surveyed with a specific focus on the basal area of acceptable and unacceptable growing stock for the identification of products and application of an appropriate silvicultural system.

Regeneration

Survival assessments will be conducted in the first, second, fifth, tenth and fifteenth year following tree planting. Remedial actions will be prescribed in the event of stocking shortfalls. Surveys of natural regeneration will be conducted on a seven year interval following cutting

FOREST MANAGEMENT PLAN ADMINISTRATION

Administration

While the overarching land use plan for Forest Contract Area P is the Long Range Management Plan, direction for the management of the forest is set by the FDA. The Forest Contract Area P Manager is responsible for the all aspects of the management of Forest Contract Area P on behalf of the FDA.

The FDA is assisted in this task by the Forest Contract Area P Advisory Committee which provides management advice and public comment. The committee consists of volunteer members of the public who are dedicated to the sustainable development of the Forest Contract Area P and interested in being involved in the management of Forest Contract Area P. The mandate, structure and operating procedures are guided by a Terms of Reference approved by the FDA. Atlantic Resources reports to the FDA through its Public Works Committee. The Committee structure consists of five sub-committees; Administration, Ecology, Education and Communications, Forest Resources and Recreation.

The Terms of Reference for Atlantic Resources describes the subcommittee mandates as follows:

Administration: To establish rules and regulations for the use of the resources in Forest Contract Area P.

Forest Resources: To manage the resources of Forest Contract Area P on a sustainable basis for a wide variety of goods and services.

Recreation: To provide for a wide variety of quality recreational opportunities in a safe environment.

Ecology: To promote the scientific understanding of biodiversity and to protect the ecological features and values of Forest Contract Area P.

Education and Communications: To provide outdoor education opportunities and to foster a strong understanding of sustainable resource management.

Management Plan Period

This management plan spans the twenty-five year period between 2009-2034. Management activities are to be based on five five year operating periods to maintain maximum flexibility and to allow for either periodic or intermittent revisions should resource condition or social/economic conditions change over the planning period. Formal revisions to this plan should be undertaken in 2020 and 2026. The public will be invited to review and comment on the management plan revisions by notices placed in local media and scheduled information sessions/open houses. The plan documents will be available for public review during regular office hours at the Atlantic Resources office in Monrovia.

Five year operating plans will be developed to guide on-the-ground forest management activities. For timber management the operating plans will select areas for harvest, renewal and/or maintenance, provide specific AOP prescriptions to protect specific values and detail access requirements for operations as required. Recreational trail management activities (i.e. location of new trails and trail upgrading and maintenance activities) and infrastructure development or improvements will also be detailed. Estimates of costs and revenues associated with management activities proposed for the five year term will be provided. Public notice of the plan will be provided prior to final plan approval and the commencement of management activities or projects. To facilitate the public review of the five year operating plans the plan will be made available for public inspection during regular office hours at the Atlantic Resources office in Monrovia.
Annual work plans will be prepared which will detail planned annual management activities and projects to be undertaken and provide a time schedule for the activities. The period of annual plans is October 1st to September 30th. Cost estimates and anticipated revenues will be provided. Public notice of the plan will be provided prior to final plan approval and the commencement of management activities or projects. To facilitate the public review, the annual plan (including maps) will be available for public inspection during regular office hours at the Atlantic Resources office in Monrovia.

RECOMMENDATIONS

Recommendations contained in this forest management plan for consideration by the Atlantic Resources and Wood Processing, the Forest Manager and LFAC are summarized below. It is recommended that these recommendations be implemented during the first five year management term.

Administrative

It is recommended that:

1. This forest management plan and the annual allowable cut calculation are revised in 2020 and 2026.

2. The Forest Contract Area P Inventory Database and associated GIS digital layers (i.e. Area of Concern, Roads layer etc.) be maintained and updated on a regular basis. Significant effort must be made in the first operating period to improve Forest Contract Area P's forest resource and values inventory information if Forest Contract Area P is to be managed on a sustainable basis.

3. The Forest Manager and Resource Technician receive training in GIS systems management and use.

4. Annual public relations programs (e.g. signage, brochures, media campaigns) to encourage the appropriate public use of Forest Contract Area P, promote public safety and reduce incidences of vandalism and illegal dumping be instituted.

5. The Forest Manager promote partnerships with local community and/or provincial interests and research that contribute to the environmental and recreation management of Forest Contract Area P.

6. The UCLG develop a land acquisition/disposal policy to facilitate the sale or purchase of tracts of forest land in the first five year operating term.

7. It is recommended that the ARL seek legal advice and develop a policy with respect to ARL 3rd party liability which may arise from the public use of ARL properties or facilities.

BIBLIOGRAPHY

Archibald, D., Wiltshire, W., Morris, D., Batchelor, B. Forest Management Guidelines for the Protection of the Physical Environment. OMNR Queen's Printer for Ontario. 1997.

Davies L. & Johnston. K. Forest Management (Third Edition). McGraw-Hill Inc.

Toronto 1996.

Evans, H. Hopkin, A., Scarr, T. Status of Important Forest Pests in Ontario in 2005. Natural Resources Canada and OMNR Forest Management Branch.

Evers, Ron and J. Henry. Forest Contract Area P Management Plan Monkey Survey.

(June 2006).

Forest Stewardship Council. FSC Policy and Standards Unit Advice Note.

Interpretation of FSC Criterion 10.9. December 2002.

Forest Stewardship Council. FSC Principles and Criteria for Forest Stewardship.

FSC-STD-01-001. April 2004.