Camp Lejeune Silvicultural System

A good silvicultural system is not chosen but formulated as a solution to a specific set of circumstances. The silvicultural system must be responsive to natural factors affecting the forest ecosystem, and capable of evolutionary development as circumstances change, knowledge of the forested environment improves, and regulatory requirements change. The objective of the Camp Lejeune silvicultural system is to provide a safe, healthy, sustainability, forest ecosystem, with a minimum of environmental restrictions, to support Marine Corps training objectives. In order to accomplish this, the Forest Management Section manages forest resources to recover the RCW and conserve other critical natural resources.

An even-aged silvicultural system was implemented by the 1946 management plan. This system has proven useful for the multiple-uses and sustainable forest products over many decades. However, with the new USFWS RCW Recovery Plan standards for “good quality habitat”, Camp Lejeune will be emphasizing practices that more closely resemble two aged and uneven aged management in many cases.

Camp Lejeune has longleaf restoration as a major goal. Longleaf restoration in a landscape dominated by loblolly can be difficult and complicated by factors such as soil wetness, ground cover, and RCW requirements. Camp Lejeune intends to apply a flexible (rather than proscriptive) management approach to longleaf restoration, consistent with the 2003 Recovery Plan, in order to maximize practical benefits to each RCW partition. Collaboration between the Threatened and Endangered Species and Forestry sections will ensure that all prescribed treatments are appropriate given the site-specific circumstances.

Camp Lejeune is divided into 91 compartments with the average size being approximately 1,000 acres of commercial forestland. Each compartment is further divided into timber stands. Management of the forest ecosystem is accomplished at the stand level, with stands normally being ten acres or more and delineated by species, age, size, and stocking levels.

Timber rotations are established at 120 years for longleaf pine, pond pine, and upland hardwood species and at 100 years for loblolly pine. Currently, bottomland hardwood communities and RCW nesting sites are not assigned a rotation age. For management purposes, forestland aboard Camp Lejeune is divided into four major forest types:

- Pure pine (Society of American Foresters (SAF) 81 and 70)* found on upland drier sites;
- Pond pine (SAF-98)* found on wet sites;

- Upland hardwood and mixed pine/hardwood (SAF-52, 71, 82, and 87)* found on stream sides and more productive sites; and

- Pure hardwood (SAF-91, 92, 102, 103, and 104)* found on stream bottoms and floodplains of major creeks.

The characteristics and general conditions of the major tree species, such as tolerance to shade, susceptibility to wind throw; adaptability to soil moisture conditions; ability to withstand flooding; and vulnerability to insects, disease and fire determine the type of silvicultural treatments recommended during the prescription process.

Forest Management Principles

The management of forestland used extensively for military training operations presents unique management opportunities. The Forest Management Section at Camp Lejeune has provided a varied forested environment for military training since the development and implementation of the first natural resources management plan in 1946. Utilizing the ecosystem management approach, the Forest Management Section emphasizes returning the longleaf pine ecosystem wherever appropriate to its historic range on Camp Lejeune. The Forest Management Section has historically used area regulation to manage quantities of timber harvested. Standing growing stock volumes and associated timber information are necessary to ensure that over-harvesting is not occurring. A comprehensive multiple use inventory helps the Forest Management Section to assess forest level trends. Camp Lejeune has undergone six inventories since 1946. An inventory developed specifically for Camp Lejeune was implemented in 1996. Field data collection was completed in March of that year, but in

July and August hurricanes Bertha and Fran made landfall in eastern North Carolina when the eye of both storms passed over the base. Both storms were category III hurricanes and did significant damage to the forest resources aboard the base. Not only were the hurricanes directly responsible for wind damage to the forest but also left the remaining trees in a highly stressed condition. As a result, southern pine beetle populations erupted and a major epidemic occurred beginning in May of 1997 and lasting well into the winter. Because of the major impacts to the forest the 1996 inventory had to be discarded as a decision management tool and another inventory was initiated in 1999.Using the 1996 and 1999 data, the Forest Management Section was able to determine exactly how much impact the hurricanes and southern pine beetle infestation had on the forest resources. Tables 1 and 2 show volume of growing stock by cause of death for mainside and Greater Sandy Run from the FY99 inventory. The data shows that mortality greatly exceeded all removals in spite of the program's best efforts to salvage as much timber as possible. The softwood inventory for Mainside was reduced by approximately 28%. Salvage efforts were concentrated on Mainside because of the greater value

Table 1. Volume (in thousands) of Growing Stock by cause of death and species, mainside, Camp Lejeune, FY99 inventory.

		All Species		Softwoods		Hardwoods	
	Cause of Death	**Cubic**	**Board Feet**	**Cubic**	**Board Feet**	**Cubic**	**Board Feet**
Removals							
	Logging	11003	46795	9832	44559	1171	2236
	TSI	165	845	165	845	0	0
	Turpentine	0	0	0	0	0	0
	Clearing	687	2302	420	1920	268	382
	Non-forest	0	0	0	0	0	0
	Military	0	0	0	0	0	0
	All Removals	11855	49943	10417	47325	1439	2618
Mortality							
	Insects	5534	23955	5500	23955	4	0
	Disease	67	377	67	377	0	0
	Fire	691	1817	208	779	38	1038
	Animals	0	0	0	0	0	0
	Weather	18224	68332	9937	46270	149	22062
	Suppression	28	0	28	0	0	0
	People	0	0	0	0	0	0
	Military	20	0	20	0	0	0
	Other	116	71	39	0	5	71
	All Mortality	24680	94551	15799	71380	8880	23171
Total Losses		36535	144494	26216	118705	10319	25789

** All removals and mortality volumes represent the losses since previous forest inventory.

**All salvaged dead trees are included as mortality

Table 2. Volume (in thousands) of growing stock by cause of death and species, Greater Sandy Run area Camp Lejeune, FY 99 inventory.

		All Species		Softwoods		Hardwoods	
	Cause of Death	**Cubic**	**Board Feet**	**Cubic**	**Board Feet**	**Cubic**	**Board Feet**
Removals							
	Logging	1192	3621	1135	3329	58	292
	TSI	16	0	16	0	0	0
	Turpentine	0	0	0	0	0	0
	Clearing	1589	960	1589	960	0	0
	Non-forest	124	0	124	0	0	0
	Military	0	0	0	0	0	0
	All Removals	2921	4581	2863	4289	58	292
Mortality							
	Insects	1984	5022	1984	5022	0	0
	Disease	68	0	68	0	0	0
	Fire	92	0	92	0	0	0
	Animals	0	0	0	0	0	0
	Weather	3861	8743	2625	6329	16	2414
	Suppression	45	0	45	0	0	0
	People	0	0	0	0	0	0
	Military	0	0	0	0	0	0
	Other	82	155	20	0	1	155
	All Mortality	6134	13920	4836	11351	1298	2569
Total Losses		9055	18501	7699	15641	1356	2861

** All removals and mortality volumes represent the losses since previous forest inventory.

**All salvaged dead trees are included as mortality

of the forest products on that part of the Base. Approximately 40% of the damaged timber on Mainside and 27% of the damaged timber in GSRA was salvaged. Salvage efforts were concentrated on Mainside because of the greater value of the forest products on that part of the Base. One of the significant facts demonstrated by the 1999 inventory is that the storms and southern pine beetle infestation negatively affected the growing stock volumes on all but one of the tree species listed. Longleaf pine showed a growth during the period between the two inventories. The longleaf pine is known for its strong taproot, which makes it more resilient during catastrophic natural events than the other southern pine species. Abundant resin production gives the longleaf pine the ability to withstand insect and disease attacks. The remarkable growth history of the species allows it to reproduce abundantly in an environment where fire is a natural occurrence. With these reasons and with longleaf pine considered a key component in what constitutes suitable or high quality habitat for the red-cockaded woodpecker the Forest Management Section has been returning longleaf to its native sites aboard the base since the late 1980s.

Charts within Figures 1-5 show the age class distribution for pure loblolly and longleaf pine, mixed pine/hardwood and pure hardwood and where those species occur (excluding GSRA). Note that all these charts show a significant lack of forest regeneration with the exception of pure pine in the last 20 years. Figures 6-9 show the amount of forest acres managed broken into 5 year age classes.

The 2003 RCW Recovery Plan establishes standards for 14 inch, 10 inch, and less than 10 inch dbh trees in order to qualify for “good quality habitat”. As Camp Lejeune works toward its recovery goal for RCWs, the emphasis will be on meeting the criteria for “good quality habitat” rather than the “balanced age

Table 2. Volume (in thousands) of growing stock by cause of death and species, Greater Sandy Run area Camp Lejeune, FY99 inventory.

will ensure that

The composition of the forest is a significant component of all forest management decisions. The distribution of pure pine (70% or more of the basal area of a stand is in pine), pure hardwood (70% or more of the basal area of the stand is in hardwood) and mixed pine/hardwood (less than 70% of the basal area of the stand is in pine) are a significant factor in making compartment level forest management decisions.

Figure 1. Age Class Distribution for Loblolly Pine aboard MCB Camp Lejeune, NC

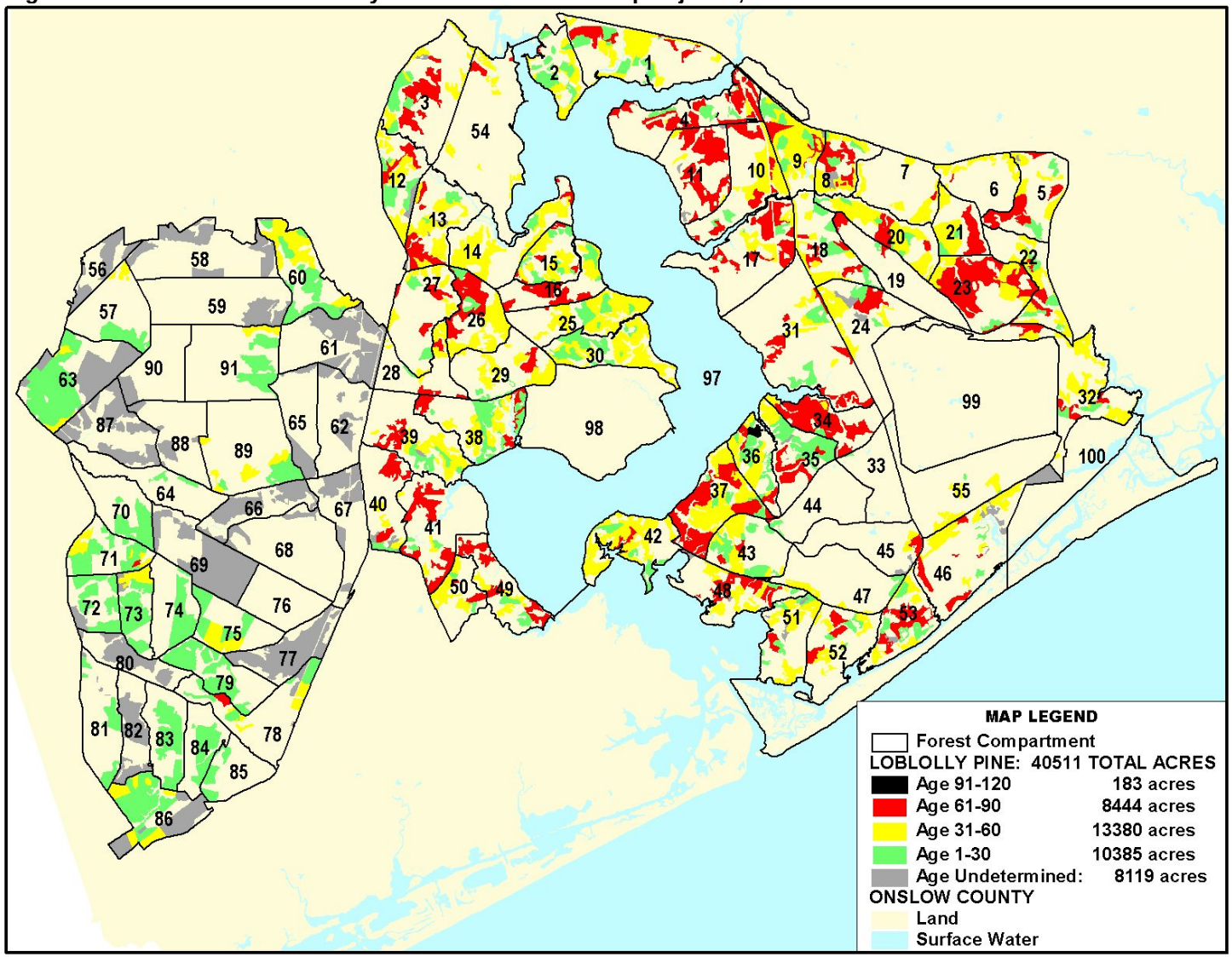


Figure 2. Age Class Distribution for Longleaf Pine aboard MCB Camp Lejeune, NC

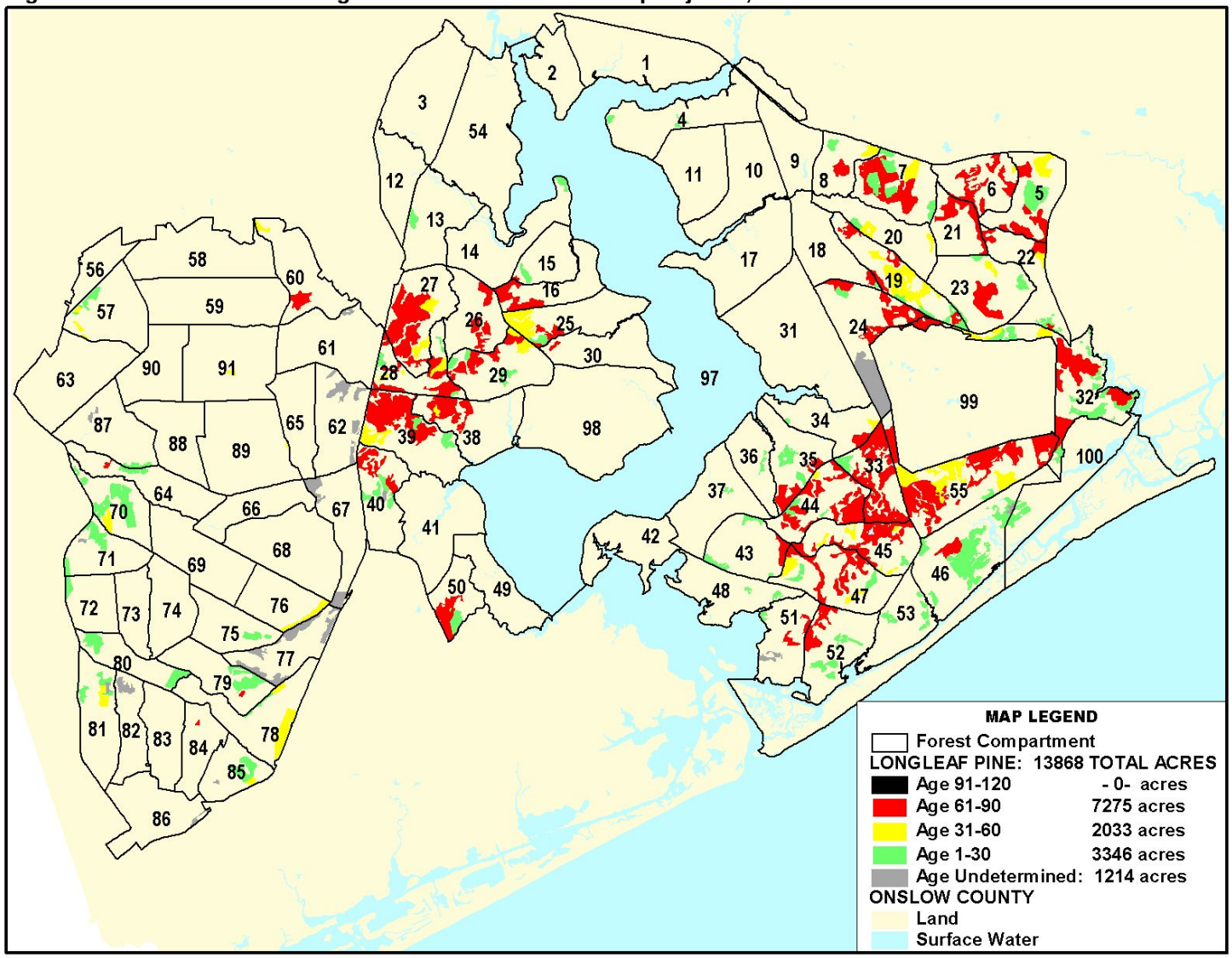


Figure 3. Age Class Distribution for Mixed Pine/Hardwood aboard MCB Camp Lejeune, NC

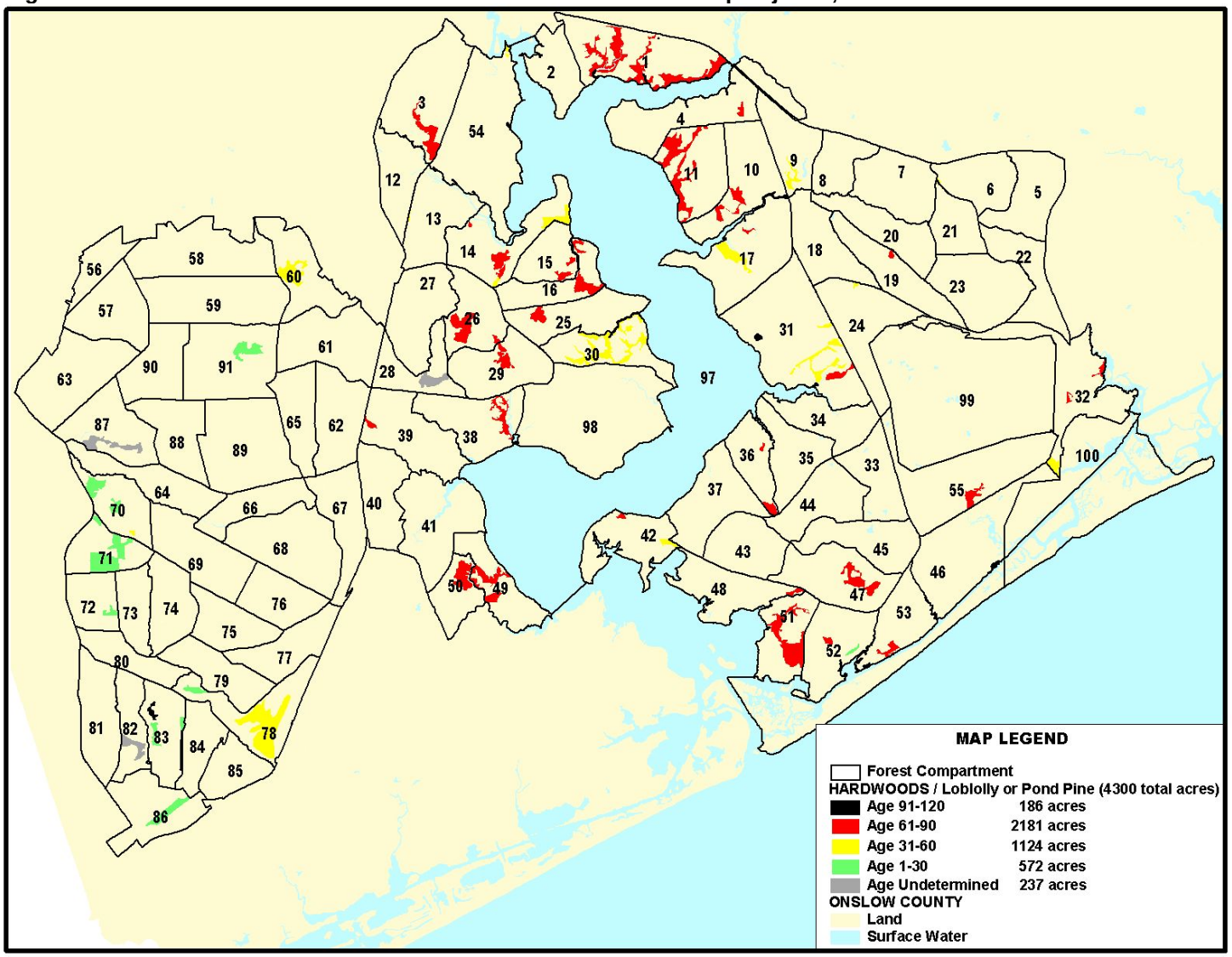


Figure 4. Age Class Distribution for Pure Hardwood aboard MCB Camp Lejeune, NC

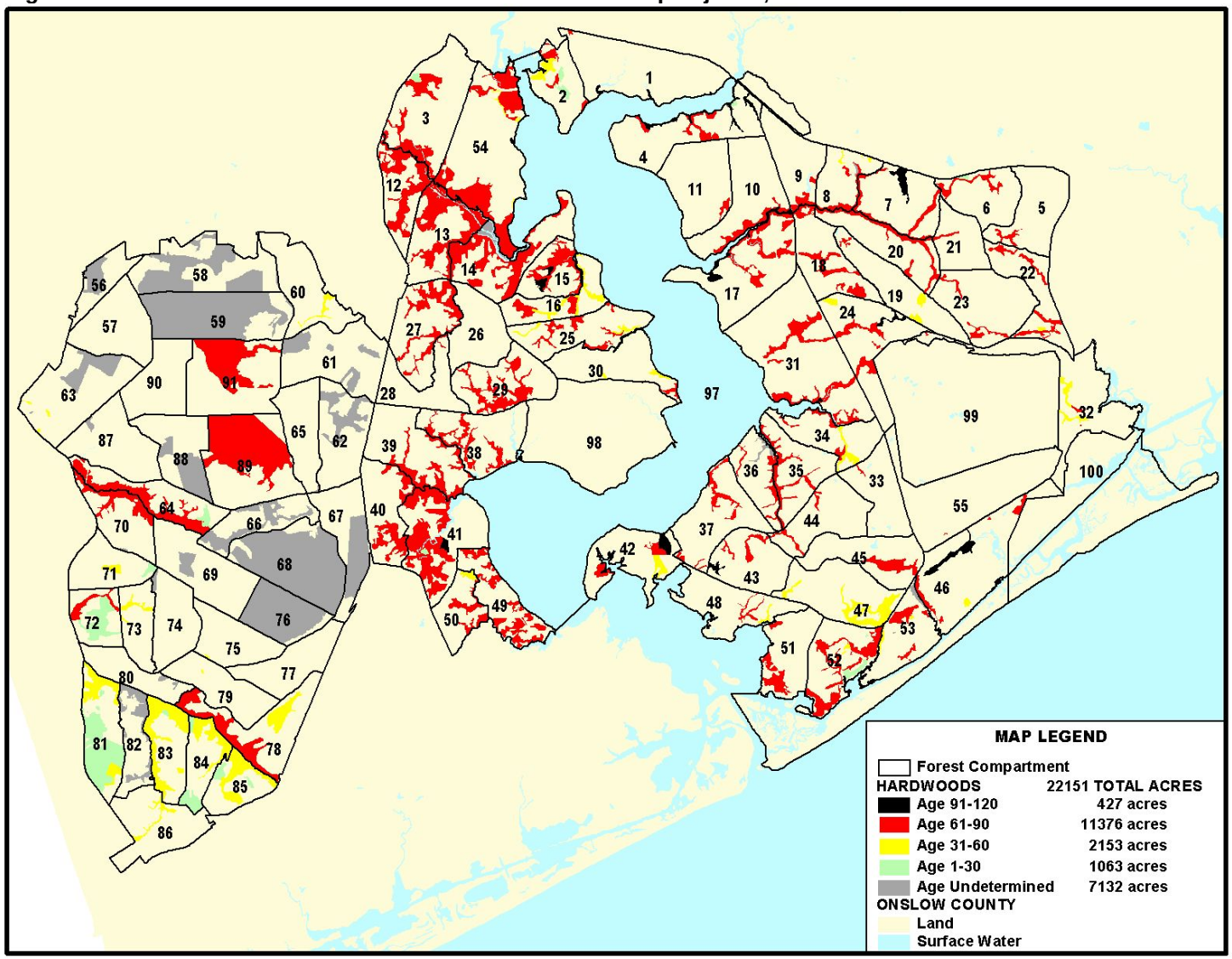


Figure 5. Forest Composition by Landtype Aboard MCB Camp Lejeune, NC

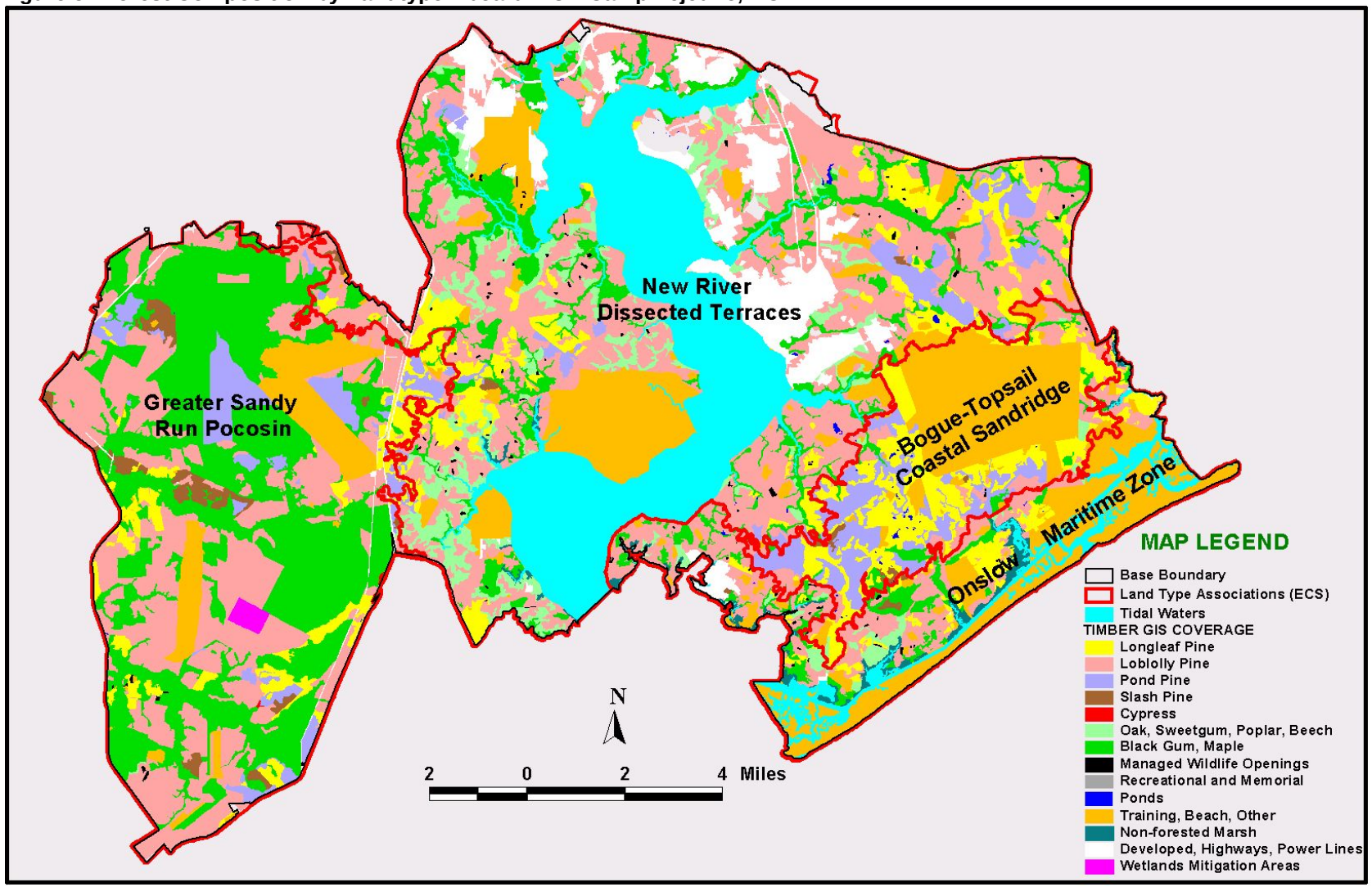


Figure 6.

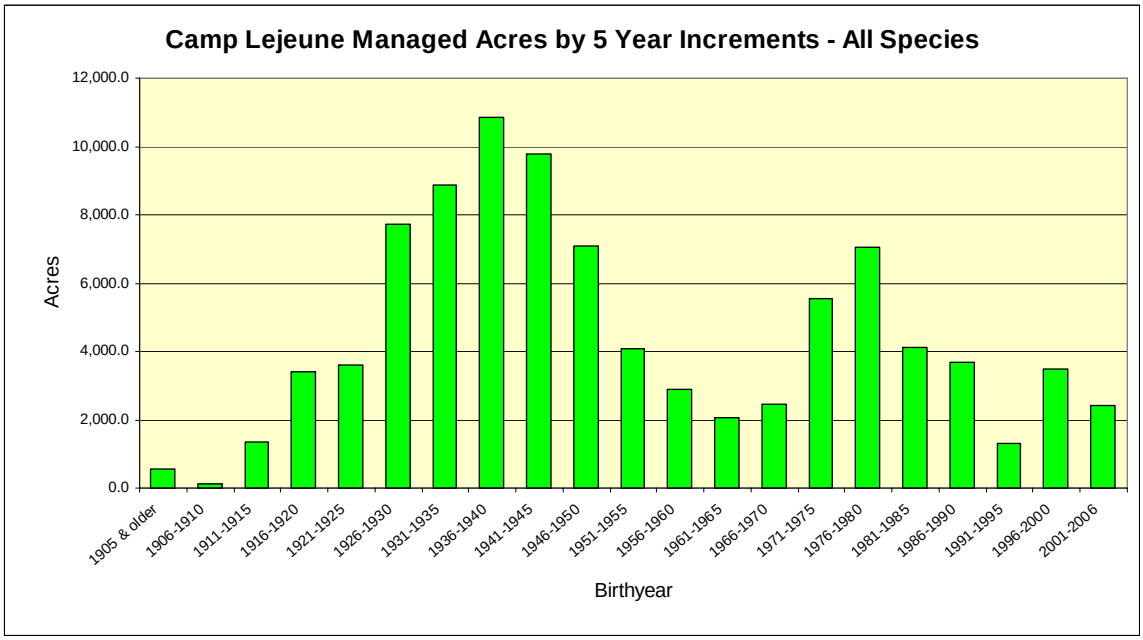
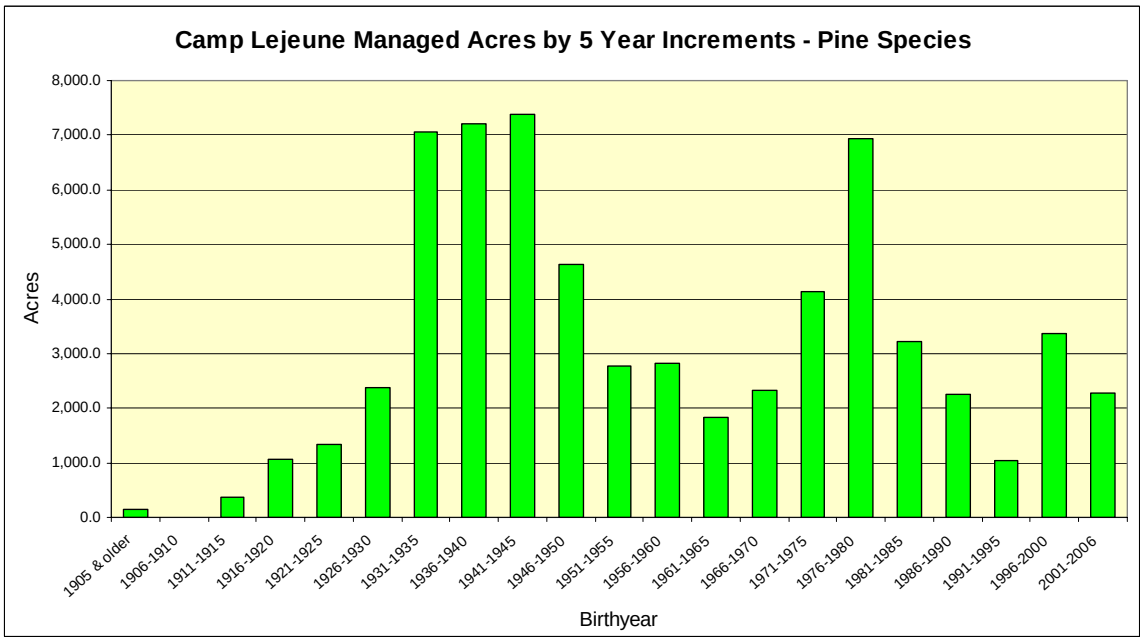
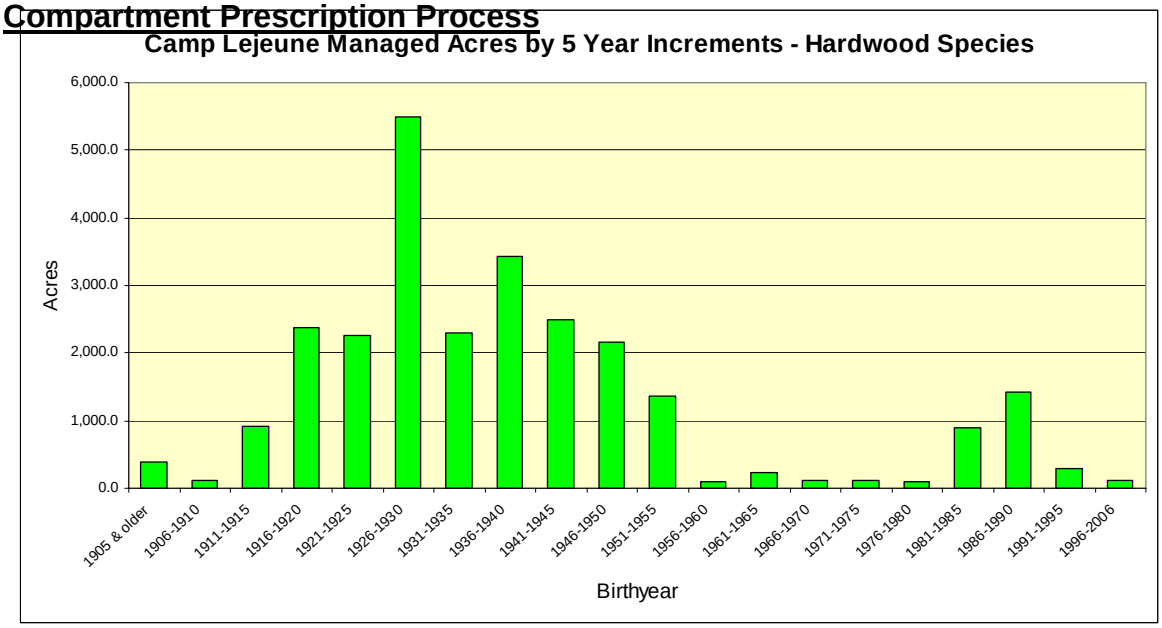


Figure 7.



Compartment Prescription Process



The forest compartment prescription process is the basis for making stand level forest, wildlife, and training area management decisions to fulfill long-range ecosystem management goals and objectives. The purpose of the forest prescription is to:

- Determine the site productivity, forest type, age, stocking densities, operability, and forest condition classes at the stand level.
- Collect data required to determine the pre-harvest condition of the foraging habitat for RCW or other endangered or threatened species and accurately determine the effects of the harvest on the foraging habitat.
- Determine the silvicultural treatment, if any, required on a stand-by-stand basis and determine its effect on the forested ecosystem and military training.
- Develop an ingress and egress management and maintenance plan.
- Collect timber data to determine timber volume estimates on a stand-by-stand basis.
- Ensure the proposed actions are consistent with the NEPA and other applicable laws and regulations.

The Forest Management Section employs Best Management Practices (BMPs), developed by a team of forestry and sedimentation experts and recommended by the NC DENR, Division of Forest Resources. Developed in 1989, BMPs include recommendations for accessing and harvesting forest products, site preparation and reforestation, re-establishment of vegetation on disturbed areas, and

wildlife protection. BMPs are "practices chosen to minimize erosion and prevent or control water pollution resulting from forestry operations (NC DFR 1989)."

Implementation phases of BMPs include pre-timber harvest planning, logging operations, and project closeout. The specifics for each of these phases are as follows:

- Pre-harvest Planning, including designating streamside management zone boundaries, locating haul roads and stream crossings, and designating logging deck operations.
- Logging Operations, including timber cutting and skidding, log loading and transport, and protecting streams and water quality.
- Project Closeout, including removal of temporary stream crossings; removal of logging debris from streams; providing vegetative cover for bare ground using logging debris, grass and mulch, or other suitable materials and/or methods; construction of water bars as needed on roads, trails, and logging decks; and removal and disposal of potentially toxic waste, tires, old wire cable, used engine oil, trash, etc.

The prescription process is the vehicle used to integrate forest management activities with other land management and land use organizations. Procedures for the development of a compartment prescription may be found in the United States Forest Service Manual, 2400. The Base is managed on a ten-year review cycle, which means each compartment is visited once every ten years for prescription review. Approximately ten compartments are reviewed each year. The Long Range Silvicultural Prescription Plan (LRSPP) is an annual operating plan, which outlines silvicultural management goals for those ten compartments for the next several years. The draft LRSPP is made available for review on Camp Lejeune's GIS intranet website. Comment and review is requested from the Directors of Range Development Davison and Range Control Division; Director Training and Operations; and program managers within the Environmental Management Division.

Each Director is responsible to ensure their staff adequately reviews the proposed treatments and forwards comments to the Forest Management Program manager. The Forest Management Program manager reviews and incorporates comments and modifications are made to the LRSPP as required to accomplish the objectives of the group. The final LRSPP is then made available on Camp Lejeune's GIS intranet website.

Site Preparation

Adequate preparation of the site to be regenerated is key to a successful regeneration effort. A well-prepared site provides for control of both shade and root competition, which is critical to the establishment and growth of intolerant species such as hard mast producing hardwoods and longleaf

pine. The least intensive site preparation method, based on site conditions, will be applied to each regeneration site.

Natural Regeneration. The selection of a site preparation method depends on the amount of debris remaining on the site after logging but is always the method with the least impact to the soil and with the highest probability of successful establishment of the new stand. Site preparation for natural hardwood regeneration consists of hand or mechanical felling of residual non-commercial trees. In areas that have been shelterwood harvested for hardwood regeneration, site preparation is sufficient to expose mineral soil to the seed fall.

Artificial Regeneration. Site preparation for artificial pine regeneration is accomplished by several techniques based on soil type and characteristics of the site such as residual logging debris, woody and herbaceous competition control needs, and species to be planted. Selection of the technique is consistent with the desire to ensure successful stand establishment and minimum soil disturbance.

Timber Management

Timber stands on Camp Lejeune are divided into three general groups—1) Pure Pine, 2) Mixed Pine-Hardwood, and 3) Pure Hardwood.

Camp Lejeune has approximately 31,890 acres in pure pine stands, including 8,758 acres that are pure longleaf pine stands, 16,550 acres that are pure loblolly stands, 2,301 acres that are pure pond pine stands, and 102 acres that are pure slash pine stands. An additional 4,179 acres are considered pure pine stands that contains a mixed pine component. These acreage figures do not include GSRA. Age class distributions for loblolly and longleaf aboard Camp Lejeune are shown in Figures 6.3 and 6.4 respectively. A pure pine stand is defined as a stand with 70% or more of the stand occupied by pine species. Pond pine and longleaf pine are managed on a 120-year rotation. Loblolly pine is managed on a 100-year rotation

Camp Lejeune has approximately 11,237 acres that are considered mixed pine-hardwood. This includes 8,589 acres with pine as the dominant species and 2,648 acres with hardwood as the dominant species. A mixed pine-hardwood stand is defined as a stand where 30% or more of the stands is occupied by the co-dominant species. The dominant species may be pine or hardwood. These acreage figures do no include GSRA.

Camp Lejeune has approximately 359 acres in pure upland hardwood stands. This consists of stands dominated by poplar, sweetgum, white oak, or red oak species. . Upland hardwoods are managed on a 120-year rotation, primarily for the benefit of wildlife. Hardwood stands are regenerated using the shelterwood system for hardwoods. Preference is given to hard mast producing species, leaving approximately 50 ft^2 basal area/acre. When adequate regeneration is

present, the overstory should be removed to prevent overstocking and suppression of the hardwood regeneration. Many desirable hardwood species will stump sprout, especially if harvested in the winter months. Occasionally, clearcuts are used in hardwood stands to take advantage of advanced reproduction and viable seed in the duff. Figure 6.6 shows age class distribution for pure hardwood aboard Camp Lejeune.

The fragile nature of the soils associated with bottomland hardwood areas and the historically poor market value of associated timber products necessitate exclusion of these areas from timber harvesting. Forested wetlands, which include bottomland hardwood areas, are among some of the most important ecological habitats in the Southeast. Forested wetlands on Camp Lejeune are diverse and include high and low pocosins, Carolina Bays, and riparian wetlands. Wetlands management and protection is addressed in Chapter 10. Management and silvicultural activities on Camp Lejeune consider the ecological value of forested wetlands and predominately consist of conservation and preservation of these areas. These management actions are consistent with the overall goal of restoration and protection of mature forested wetlands. Construction projects located in these areas may require timber harvesting, provided all environmental concerns have been appropriately addressed.

Due to difficulty in managing for the longleaf wiregrass ecosystem and prescribing fire in the cantonment area, timber in the cantonment area (as described in the following pages) will be managed for a greater emphasis on mast producing species and loblolly pine.

A typical bottomland hardwood stand on Camp Lejeune

Longleaf Pine Restoration

Historically, longleaf pine was the predominant timber species in the southern coastal plain. With the "cut-out and get-out" harvesting practices, the turpentine industry, and the exclusion of fire since the early 1900s, loblolly pine and hardwood species, historically confined to more hydric sites, began to encroach into areas that had been dominated by the longleaf. Today forest managers are presented with the opportunity to manage these mixed pine-hardwood forest, which was not a widely occurring community in the upland areas of the southeastern coastal plain. Management of these communities present challenges concerning the application of fire and their effects on the ecosystem that was historically dominated by longleaf pine and the species that depend on the longleaf community, some of which are endangered. Mixed pine-hardwood stands offer some advantages, such as hard mast production, which are beneficial to a number of wildlife species. Figure 6.5 shows age class distribution for mixed pine/hardwood stands aboard Camp Lejeune. Timber stands are converted to longleaf pine based on specific LandTypes in the Ecological Classification System.

The following methods may be employed to restore pine stands, mixed pine hardwood stands, and hardwood stands to longleaf: clearcut (not to exceed 40 acres), modified clearcut (retaining with 6-10 trees/acre), underplanting longleaf seedlings (retaining 40 sq ft of trees)

- Clearcut—This method will only be used when the residual timber is not suitable as a seed source or when conversion to longleaf pine is desired. Clearcutting is the harvesting of all merchantable trees in a stand in one operation, with a new stand of trees established by artificial means. In a clearcut, regeneration is established after site preparation by planting long leaf pine seedlings. Clearcuts will not exceed 40 acres.

Clearcut with minimal ground disturbance.

- Modified Clearcut—This method is similar to the clearcut method but 6-10 dominant or co-dominant trees per acre will be left, based on requirements of the 2003 RCW Management Plan.

- Underplanting Longleaf Pine Seedlings—This method of longleaf pine restoration requires leaving a residual basal area of 40 square feet per acre and underplanting longleaf pine seedlings. This method is usually accomplished in loblolly pine dominated stands.

Intermediate Thinning

An intermediate thin is a silvicultural treatment made in the stand during the rotation before a regeneration harvest. When thinning pine or mixed pine hardwood stands where the pine is equal to or greater than 10" DBH, Camp Lejeune will retain a pine basal area of approximately 60 sq ft.

Intermediate Thins in Pure Pine Stands

- Pre-commercial thin—Using a drum chopper pulled by a dozer tractor, rubber-tired Hydro-Axe with Fecon mowing head, or hand tools to reduce stocking levels in unmerchantable timber stands.

A naturally regenerated loblolly pine stand on Camp Lejeune. Strips of unmerchantable timber have been mowed with a rubber tired Hydro-Axe with Fecon mowing head to reduce stocking levels.

- Leave tree thin—Leaving dominant or co dominant trees based on spacing and determined by the average DBH. When thinning stands that contain trees greater than 10 inches dbh, Camp Lejeune will maintain a residual pine basal area of 60 square feet per acre, dependent on site and stand condition. When thinning stands that contain trees less than 10 inches dbh or are receiving the first commercial thin,

Camp Lejeune will maintain a pine basal area of 70-80 square feet per acre. Leave tree thins are normally used in pine-dominated stands, but may be utilized in mixed pine-hardwood stands or pure hardwood stands. Using the leave tree method of thinning overstocked pine stands, helps prevent loss from southern pine beetle, and major wind events, uses the growing space, improves the quality of residual timber and prepares the stand for natural regeneration at rotation.

In a leavetree thin, the trees that are not to be harvested ("leavetrees") are painted with a blue circle at approximately 4.5 feet from the ground.

- Leave tree thin with hardwood consideration—Same as a leave tree thin, but desirable dominant or co dominant mast producing hardwood is marked as the leave tree. Normally used in pine-dominated stands. This system is applied in the same manner as a leave tree thin used for thinning pure pine except a desirable dominant, co-dominant mast producing hardwood can be marked as the leave tree. This system is designed for use in stands to improve wildlife habitat. This system ensures that the best mast producing trees remain at rotation and the growing space is utilized.

A leavetree thin with hardwood consideration shows a dominant hard mast producing species marked as a leave tree.

- Hardwood Removal—An intermediate harvest to remove dominant and co-dominant hardwood species. Designed to improve RCW habitat. A maximum of 10% of the canopy may be occupied by hardwood species.

- Row thin—An intermediate thin normally used in pine plantations. Usually the first commercial thin performed in a stand. May be a third or fourth row thin, which means every third or fourth row will be removed. May also be used in conjunction with an operator select thin, where the feller/buncher operator thins the remaining rows to a desired residual basal area.

Fourth row thin. Every fourth row is removed.

- Crown thin—An intermediate thin normally used in pine stands where part of the stand may have stems found in thick clumps and other parts of the stand may be open. Crown closure is a determining factor in which trees to remove.

A recently completed crown thin in a longleaf pine stand.

- Improvement cut — Improvement cuts are made in stands where the stand is a mixture of desirable and undesirable trees. The undesirable trees are removed to improve the stand for timber growth, wildlife habitat improvement, aesthetic appeal, recreational benefits, or training area improvement.

- Salvage cut—Salvage cuts are cuts designed to remove damaged or infested trees. Man-caused and natural disturbances such as windstorms, ice storms, and wildland fires can cause damage in a forest stand. Salvage cuttings are made on an emergency basis to use damaged timber, reduce economic loss, improve aesthetics in an area, reduce fuel loading, and prevent the spread of insects and disease.

Intermediate Thins in Mixed-Pine Hardwood Stands

- Pre-commercial thin—Using a drum chopper pulled by a dozer tractor, rubber-tired Hydro-Axe with Fecon mowing head, or hand tools to reduce stocking levels in unmerchantable timber stands.

- Leave tree thin—Leaving dominant or co-dominant trees based on spacing and determined by the average DBH. When thinning stands that contain trees greater than 10 inches dbh, Camp Lejeune will maintain a residual pine basal area of 60 square feet per acre, dependent on site and stand condition. When thinning stands that contain trees less than 10 inches dbh or are receiving the first commercial thin, Camp Lejeune will maintain a pine basal area of 70-80 square feet per acre. Leave tree thins are normally used in pine-dominated stands, but may be utilized in mixed pine-hardwood stands or pure hardwood stands. Trees selected as “leave trees” may be pine or hardwood species, or a combination of both. Using the leave tree method of thinning overstocked mixed stands helps prevent loss from insect and disease, and major wind events. This harvest method improves the quality of residual timber and prepares the stand for natural regeneration at rotation.

- Crown thin—An intermediate thin normally used in pine stands, but may be utilized in mixed stands. Used in stands where part of the stand may have stems in thick clumps and other parts of the stand may be open. Crown closure is a determining factor in which trees to remove.

- Improvement cut — Improvement cuts are made in stands where the stand is a mixture of desirable and undesirable trees. The undesirable trees are removed to

improve the stand for timber growth, wildlife habitat improvement, aesthetic appeal, recreational benefits, or training area improvement.

- Salvage cut—Salvage cuts are cuts designed to remove damaged or infested trees. Man-caused and natural disturbances such as windstorms, ice storms, and wildland fires can cause damage in a forest stand. Salvage cuttings are made on an emergency basis to use damaged timber, reduce economic loss, improve aesthetics in an area, reduce fuel loading, and prevent the spread of insects and disease.
- Pine Only Thin—An intermediate harvest in a stand to improve hardwood mast production in mixed pine hardwood stands. This treatment is normally used in compartments found in cantonment areas where hardwood is the preferred species. In stands where less than 50 square feet of desirable mast producing hardwood basal area per acre is present, a dominant or co-dominant pine should be left to give a total residual basal area of 60-70 square feet.
- Pine Removal—An intermediate harvest in a stand to improve hardwood mast production in mixed pine hardwood stands. In stands where more than 50 square feet of desirable mast producing hardwood basal area per acre is available and the site index is 90 feet or better for loblolly pine, all pine is marked for removal. This treatment is normally used in compartments found in cantonment areas where hardwood is the preferred species

Intermediate Thins in Pure Hardwood Stands

- Pre-commercial thin—Using a drum chopper pulled by a dozer tractor, rubber-tired Hydro-Axe with Fecon mowing head, or hand tools to reduce stocking levels in unmerchantable timber stands.
- Leave tree thin—Leaving dominant or co dominant trees based on spacing and determined by the average DBH. Leave tree thins are normally used in pine-dominated stands, but may be utilized in mixed pine-hardwood stands or pure hardwood stands. Trees selected as “leave trees” may be pine or hardwood species, or a combination of both. Using the leave tree method of thinning overstocked mixed stands helps prevent loss from insect and disease, and major wind events. This harvest method improves the quality of residual timber and prepares the stand for natural regeneration at rotation.

- Crown thin—An intermediate thin normally used in pure pine stands, but may be utilized in mixed pine-hardwood or pure hardwood stands. Used in stands where part of the stand may have stems in thick clumps and other parts of the stand may be open. Crown closure is a determining factor in which trees to remove.

- Improvement cut — Improvement cuts are made in stands where the stand is a mixture of desirable and undesirable trees. The undesirable trees are removed to improve the stand for timber growth, wildlife habitat improvement, aesthetic appeal, recreational benefits, or training area improvement.

- Salvage cut—Salvage cuts are cuts designed to remove damaged or infested trees. Man-caused and natural disturbances such as windstorms, ice storms, and wildland fires can cause damage in a forest stand. Salvage cuttings are made on an emergency basis to use damaged timber, reduce economic loss, improve aesthetics in an area, reduce fuel loading, and prevent the spread of insects and disease.

- Pine Only Thin—An intermediate harvest in a stand to improve hardwood mast production in hardwood stands with less that 30% pine component. This treatment is normally used in compartments found in cantonment areas where hardwood is the preferred species. In stands where less than 50 square feet of desirable mast producing hardwood basal area per acre is present, a dominant or co-dominant pine or hardwood may be left to give a total residual basal area of 60-70 square feet.

- Pine Removal—An intermediate harvest, where all pines are removed, in a stand to improve hardwood mast production in hardwood stands with less than 30% pine component. In stands where more than 50 square feet of desirable mast producing hardwood basal area per acre is available and the site index is 90 feet or better for loblolly pine, all pine is marked for removal. This treatment is normally used in compartments found in cantonment areas where hardwood is the preferred species.

Natural Regeneration of Longleaf Pine Stands

Mature longleaf stands will be managed on a 120-year minimum rotation, with an increasing emphasis on two aged and uneven aged management. The following methods may be used for natural regeneration of a mature longleaf stand (either pure pine or mixed pine hardwood): small

patch clearcut (not to exceed 5 acres), modified shelterwood (with 40 ft basal area retained indefinitely), and single tree or group selection.

- Small patch clearcut—To regenerate longleaf pine in existing longleaf stands, the preferred method at Camp Lejeune is the small patch clear method. Under this method, harvest areas ranging in size from 5 acres or less will be clearcut in stands of existing longleaf pine. By regenerating the stand through a series of small clearcuts over time, the spatial continuity of suitable habitat within the partition would not be disrupted. The difficulty of administering a stand, which includes a series of small patch clearcuts, can be diminished if the treatment is accomplished concurrently with scheduled thinning operations. This method of regeneration for longleaf pine will not occur until Landtype phases 902, 1101, 1102, 1103, and 1302 in the compartment have been converted to longleaf pine. The uneven aged management approach is emphasized with this method.

- Modified Shelterwood—Heavier seeded longleaf pine require more seed trees per acre than is left in a seedtree system. The residual seed source in a shelterwood cut should be left to a basal area of 40 square feet/acre of the best dominant or co dominant longleaf pines in the stand. The shelterwood method can be used to regenerate longleaf pine and hardwood species. The shelterwood method generally requires a series of preparatory cuts with the final shelterwood harvest designed to leave a higher quality seed source. For longleaf pine regeneration, Camp Lejeune utilizes a modified shelterwood method. Under this modified shelterwood method, 40 square feet of pine basal area remains. The overstory will not be removed, thus allowing the stand to be utilized as RCW foraging habitat. The shelterwood cut is followed by adequate site preparation to ensure seeds have access to mineral soil. This method is particularly well suited for the heavier seeded species such as longleaf pine, oaks, and hickory. This method of regeneration for longleaf pine will not occur until Landtype phases 902, 1101, 1102, 1103, and 1302 in the compartment have been converted to longleaf pine.

The shelterwood method of natural regeneration for longleaf pine showing intact ground cover.

- Single or Group Selection Cut for longleaf pine— The removal of single or small groups of mature trees uniformly across a stand. This harvest is designed to imitate natural openings such as lightning strikes or wind events. The resulting small openings will provide areas for regeneration with minimal impact to the overall structure of the stand. The preferred outcome of successive cuts is an uneven-aged stand that is continually regenerating while providing ample older growth for habitat needs.

Natural Regeneration in Loblolly Pine Stands

Mature loblolly stands that are not scheduled to be converted to longleaf will be managed on a 100-year minimum rotation, with an increasing emphasis on two aged and uneven aged management. The following methods may be used for natural regeneration of a mature loblolly stand (either pure pine or mixed pine hardwood): seed tree (with some trees retained indefinitely), small patch clearcut (not to exceed 5 acres), and single tree or group selection.

- Seedtree—This includes either: 1) maintaining the 6-10 crop trees into perpetuity or 2) maintaining a residual basal area of 40 square feet per acre into perpetuity.

The seedtree method of natural regeneration of loblolly pine is the preferred method if an adequate seed source is available.

- Small patch clearcut for loblolly pine—Under this method, harvest areas ranging in size from 5 acres or less will be clearcut in stands of existing loblolly pine. By regenerating the stand through a series of small clearcuts over time, the spatial continuity of suitable habitat within the partition would not be disrupted. The difficulty of administering a stand, which includes a series of small patch clearcuts, can be diminished if the treatment is accomplished concurrently with scheduled thinning operations.

- Single or Group Selection Cut for loblolly pine— The removal of single or small groups of mature trees uniformly across a stand. This harvest is designed to imitate natural openings such as lightning strikes or wind events. The resulting small openings will provide areas for regeneration with minimal impact to the overall structure of the stand. The preferred outcome of successive cuts is an uneven-aged stand that is continually regenerating while providing ample older growth for habitat needs.

Natural Regeneration of Hardwood Stands

- Clearcut—Desirable hardwood species will stump sprout particularly when harvested in the winter months. In this system, all merchantable pine and hardwood are removed in a single operation, with all trees greater than one-inch dbh cut for site preparation. Clearcutting not only uses stump sprouting, or coppice, but also utilizes advanced reproduction and viable seed in the forest duff to regenerate the stand. This method may be used for hardwood or pine natural natural regeneration in mixed pine-hardwood stands.

- Shelterwood—. Hardwood stands are regenerated using the shelterwood system for hardwoods. Preference is given to hard mast producing species, leaving approximately 50 ft^2

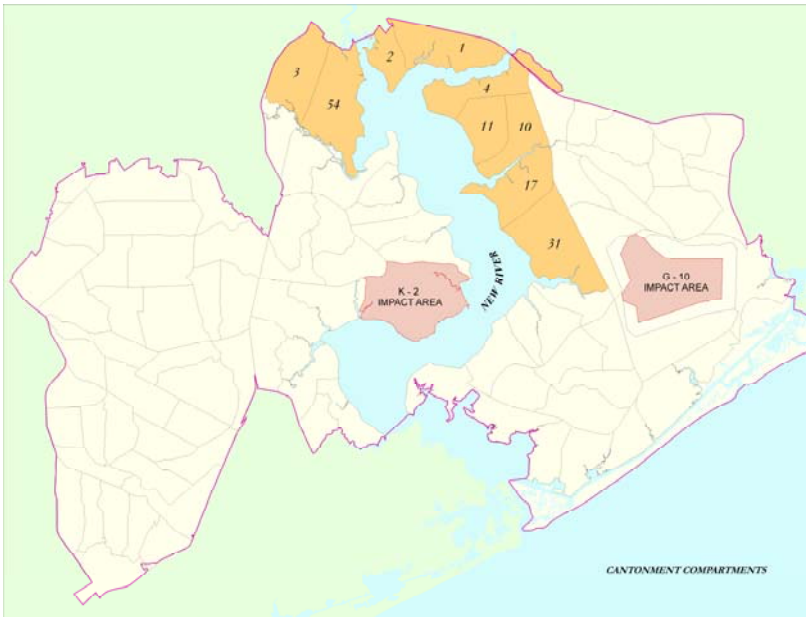
basal area/acre. When adequate regeneration is present, the overstory may be removed to prevent overstocking and suppression of the hardwood regeneration. Many desirable hardwood species will stump sprout, especially if harvested in the winter months.

- Small patch clearcut for hardwoods—Under this method, harvest areas ranging in size from 5 acres or less will be clearcut in pure hardwood stands. The difficulty of administering a stand, which includes a series of small patch clearcuts, can be diminished if the treatment is accomplished concurrently with scheduled thinning operations. Many desirable hardwood species will stump sprout, especially if harvested in the winter months.

- Single or Group Selection Cut for hardwoods— The removal of single or small groups of mature trees uniformly across a stand. This harvest is designed to imitate natural openings such as lightning strikes or wind events. The resulting small openings will provide areas for regeneration with minimal impact to the overall structure of the stand. The preferred outcome of successive cuts is an uneven-aged stand that is continually regenerating while providing ample older growth for habitat needs. Many desirable hardwood species will stump sprout, especially if harvested in the winter months.

Timber Management in Cantonment Areas

The management of forestland located in cantonment areas presents unique management opportunities. Prescribed burning is a key management tool used in the forests of Camp Lejeune for maintaining longleaf pine ecosystem health. Because of smoke management issues, Camp Lejeune is unable to prescribe burn timber stands that are intermingled with urban areas such as busy highways, schools, housing and industrial complexes. Camp Lejeune will continue to manage these areas for loblolly pine. Much of these areas are expected to be developed in the future which will further increase fragmentation. Timber compartments that are considered to be in cantonment areas are 1, 2, 3, 4, 10, 11, 12, 17, 31, and 54.



Compartments located in Cantonment Areas on Camp Lejeune

Timber in the cantonment areas will be managed as previously described in the preceding sections, with the following exceptions:

- there will be no longleaf restoration in the cantonment area
- when thinning pine or mixed pine hardwood, more than 60 sq ft basal are of pine may be retained
- when loblolly is naturally regenerated, seedtrees will eventually be removed.

Other Annual Prescription Guidelines

Timber Marking Guidelines

The Forest Management Section staff conducts timber marking at Camp Lejeune. Salvage sales may be sold based on weight or marked shortly before harvesting because of the need to remove timber quickly and completely. Regularly planned sales use timber marking or cruising, to accomplish silvicultural objectives, is done one or two years before harvesting so timely budget and sale preparation can be accomplished. The type of silvicultural treatment is determined during the compartment prescription process.

Timber marking operation aboard Camp Lejeune.

Contracting and Compliance Inspection

The timber sale contracting program is the dual responsibility of the Public Works Office and the Forest Management Section, under the Director, Installations and Environment. The Forest Management Section prepares timber volume estimates, writes the timber harvesting section of the specification and shows the sale to prospective bidders. The Forest Management Section also inspects the harvesting contractor to ensure that the silvicultural treatment being implemented is accomplishing the desired management objectives and that timber harvesting contract specifications are followed, and recommends contract closure after all work has been completed. The Pubic Works Office administers contract assembly, advertisement, opens bids, collects payment and conducts all official correspondence with the bidders and contractors.

There are two types of timber sales conducted at Camp Lejeune.

- Scheduled Compartment Sales. Nine or ten compartment sales are scheduled annually. These sales have completed the NEPA requirements and may encompass a number of timber stands within a compartment and various silvicultural treatments. These sales generally close after two years with extensions being granted due to adverse weather conditions or training activity requirements.

- Salvage Sales. This type of sale is used whenever the immediate removal of timber is required. The salvage sale is used to remove merchantable timber form areas that have been damaged by wildland fire, wind storms, insect or disease infestation or when timber removal is required for construction or grounds maintenance. The completion time varies with the quantities of forest products to be removed and the urgency of the removal and the contracting company is required to begin harvesting immediately.

Volume Computation

Timber volume estimates are calculated using the data gathered by the timber marking crew or after the area has been cruised. The estimated quantity and quality of the forest products to be harvested determine the intensity of the cruise. Diameter class breakdowns are developed for each scheduled timber sale base on the stand level volume estimation. The stand volumes are consolidated into payment units and each payment unit can be paid for individually or in a one-time payment for the entire sale.

Contract Writing

The Forest Management Section develops the guidelines and constraints for each sale specification. The timber sale specification along with timber sale summary sheets, payment unit summary sheets, diameter class breakdown sheets, and maps showing the sale area are sent to the Contracts and Specifications division of the Public Works Office where the contract is assembled, reviewed, and printed.

Contract Advertisement, Bidding and Award.

The Contracts division of the Public Works Office is responsible for the advertising sales and conducting bid openings for timber sale contracts. A timber sale showing date is set and Forest Management Section personnel show prospective bidders the sale area and discuss contract specifications. A government estimate is prepared by the Forest Management Section for the proposed sale. No minimum bid is required and all bids, regardless of whether above or below the government estimate, may be rejected. The high bid is normally accepted and the contract is awarded.

Timber Sale Compliance.

After the contract has been awarded, the payment unit must be paid in full before any timber harvest can occur. Once harvesting has begun the Forest Management Section inspects the harvesting operation for contract compliance and informs the Contracting Officer when official action must be taken against the contractor for failure to comply with contract specifications.

Contract Closure and Follow-up

It is the responsibility of the Forest Management Section to notify the Contracting Officer, in writing, when the contract has been completed. The Administration and Finance Section, Environmental

Management Division totals all timber additions, deletions, and any monetary adjustments. The Public Works Officer concludes all financial transactions with the contractor. When all financial obligations have been completed and the contract closed the area may be opened for firewood collection.

Timber Access Roads

The construction and maintenance of roads that are required solely for the purpose of ingress and egress for timber harvesting are maintained and constructed utilizing Forest Management Section personnel, heavy equipment, and supplies. During timber harvesting operation the contractor is responsible for maintenance of haul roads and the contractor must return the road to its pre-sale condition upon completion of the harvest.

Forest access road repaired by Base Forestry personnel.