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National Summary

Reforestation and Timber Stand Improvement Report

Fiscal Year 1999

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Message from the Director of Forest Management

Here is the Reforestation and Timber Stand Improvement Report for fiscal year (FY) 1999. As was the case last year, the contents of this report also appear on the Forest Service home page on the Internet. The report provides the following types of information:

- First, it summarizes production levels at each Forest Service nursery and seed extractory and displays service-wide production trends at these facilities. This same section also provides information on genetic resource improvement programs.
- Second, it displays reforestation program accomplishment in each region and examines reforestation program trends nationally. This same section also summarizes reforestation success in terms of plantation. We have also included information on reforestation program unit costs by region and national trends over the past few years.
- Third, it shows timber stand improvement (TSI) program accomplishment in each region and displays TSI trends nationally. This same section also includes information on TSI program unit costs by region and national trends over the past few years.
- Finally, it includes a summary of the financial status of Knutson-Vandenberg (K-V) funds in each region.

I hope that you find this report both informative and useful in examining the trends, achievements, and challenges for forest vegetation management on National Forest System lands.

Preface

This report is produced each year to provide a summary of the Forest Service's nursery, genetic resource, improvement, reforestation, and timber stand improvement programs. This report responds to the reporting requirements outlined in FSM 2470, 2490, and FSH 2409.14. Resource data summarized in this report was derived from automated reports extracted from the TRACS-SILVA data base, as well as non-automated information compiled by Forest Service nursery managers, reforestation/TSI specialists, geneticists, and silviculturists. Financial data was derived from National Finance Center obligations data for FY 1999 for reforestation and TSI programs and for the Knutson-Vandenberg (K-V) fund.

Following the Executive Summary, this report is organized in four major sections:

- **SUMMARY OF THE FY 1999 FOREST SERVICE NURSERY AND GENETIC RESOURCE PROGRAMS**

This section of the report summarizes FY 1999 production data at FS nurseries and seed extractories and assesses the production trends and future outlook for these facilities. This section also contains a summary of Forest Service genetic resource improvement programs.

- **SUMMARY OF THE FY 1999 REFORESTATION PROGRAM**

This section of the report displays FY 1999 reforestation accomplishments and program trends. This section also contains information on plantation survival and reforestation success, as well as information on reforestation program costs.

- **SUMMARY OF THE FY 1999 TIMBER STAND IMPROVEMENT (TSI) PROGRAM**

This section of the report displays FY 1999 TSI accomplishments and program trends. This section also contains information on TSI program costs.

- **FINANCIAL SUMMARY OF THE KNUTSON-VANDENBERG (K-V) FUND**

This section includes a summary of the financial status of K-V accounts in each region and key issues affecting the management of K-V programs nationally.

Included in the appendices at the end of the report are numerous tables providing more detailed information pertaining to Forest Service nurseries and seed extractories, regional reforestation and TSI programs, reforestation success, and K-V finances.

Executive Summary

Some of the highlights for FY 1999 include:

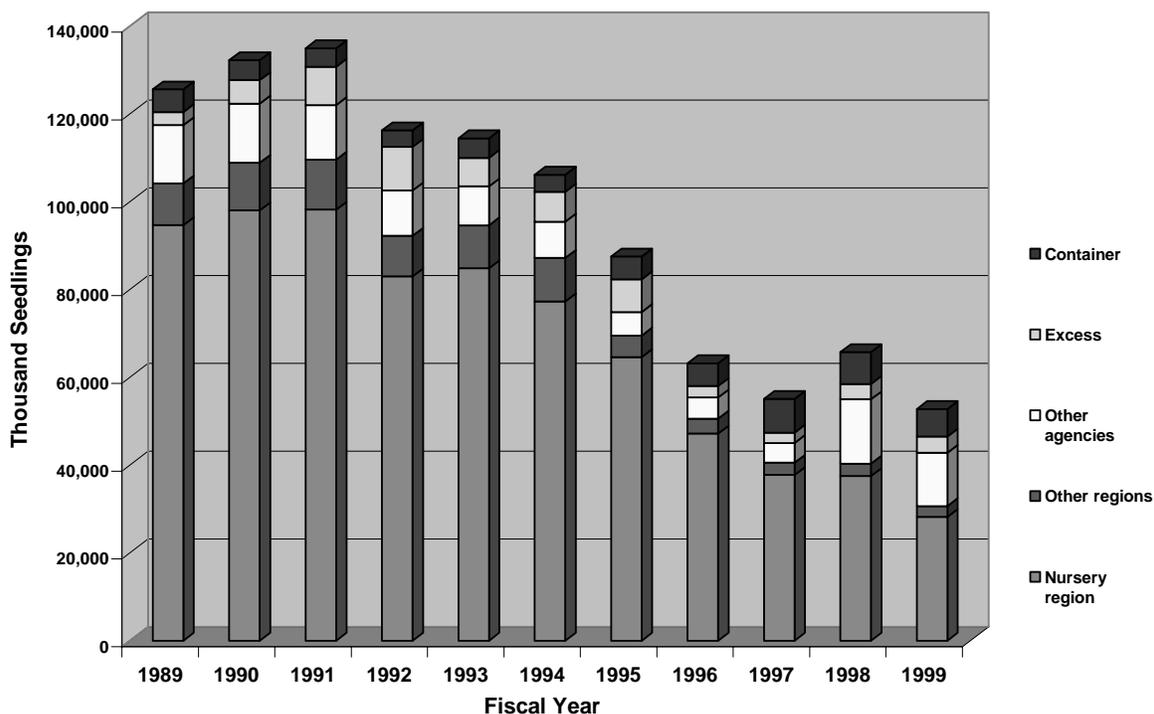
- Forest Service nurseries produced 51 million seedlings in FY 1999, a decline of about -22% from FY 1998 production levels.
- Forest Service seed extractories produced roughly 10 thousand pounds of seed representing over 150 species of grasses, forbs, shrubs, and trees.
- Silvicultural examinations were done on about 779 thousand acres and silvicultural prescriptions were developed on over 844 thousand acres to achieve a diverse array of management objectives on National Forest System lands.
- Reforestation treatments occurred on more than 268 thousand acres. About 59% of this work was K-V financed, approximately 37% was financed using appropriated funds, and the remainder was accomplished using contributed funding sources.
- Timber stand improvement (TSI) treatments occurred on just over 264 thousand acres. About 58% of the treated acres were precommercially thinned, about 36% were treated to eliminate competing weed species and release trees to maintain or improve stand growth. The remaining acres were roughly evenly split between pruning and fertilization treatments.
- Reforestation needs decreased by about 49 thousand acres while TSI needs decreased by about 5 thousand acres nationally.
- First-year survival averaged about 74% nationally and third-year survival averaged 61%.
- K-V spending outpaced K-V collections in FY 1999. K-V collections (\$110 million) represented about 49% of the value of timber harvested in FY 1999 (\$224 million). Roughly, \$283 million in K-V funds advanced for emergency fire fighting purposes needed to be repaid to the fund as of the end of FY 1999.

SUMMARY OF THE FY 1999 FOREST SERVICE NURSERY AND GENETIC RESOURCE PROGRAMS

Seedling Production at Forest Service Nurseries

Forest Service (FS) nursery production, including both bare-root and container stock, was down by about -22% from the previous year at about 51 million seedlings (Tables 1 & 2 in Appendix A). This is a continuation of marked declines generally experienced in prior years resulting from reduced timber harvests, shifting emphasis toward intermediate treatments (commercial thinnings and salvage removals), and increasing reliance on natural regeneration to achieve reforestation objectives. Production trends for the past 10 years are depicted in Figure 1.

**Figure 1
FS Nursery Seedling Production**



Seedling Production Trends, Sowing Requests, and Acquisition from Other Sources

Seedling production levels have generally been declining at FS nurseries since FY 1991. As of the end of FY 1999, production levels at these facilities had declined by -62% from the levels reported for FY 1991 (134.9 million). The outlook for future seedling orders and sowing requests are shown in Tables 1A and 1B in Appendix A. The data presented in these tables show continued declines in anticipated seedling production levels through FY 2003. Table 4 summarizes seedling acquisition from sources other than FS nurseries.

Seed Production at Forest Service Nurseries

Approximately 9.8 thousand (M) pounds of seed was produced during FY 1999, down about -18% from FY 1998 extraction levels (12.0 M pounds). Seed production levels can be highly variable from year-to-year, reflecting the unique characteristics of individual plant species and the periodicity of good seed crops in each species. These variations can be seen in the trends in seed production at FS facilities for the 10-year period shown in Figure 2.

Figure 2 -- Seed Production at FS Seed Extractories

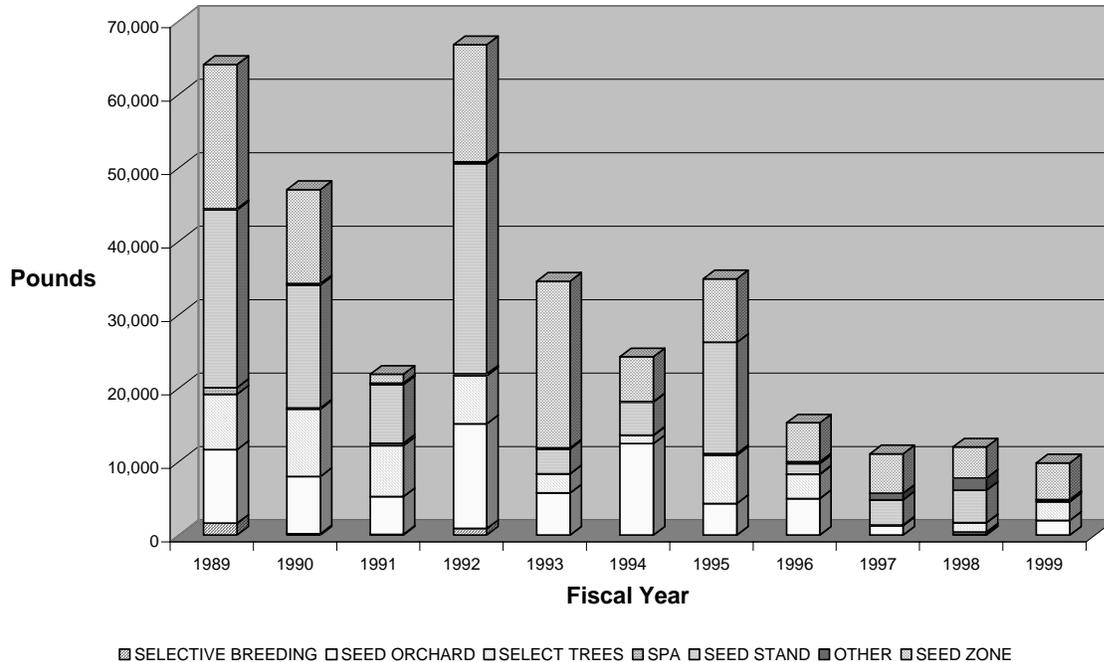


Table 3 in Appendix A summarizes the source of origin for seed processed at FS facilities in FY 1999. Over 20% of this seed was collected from seed orchards. The list of plant species being processed at these facilities includes over 150 species of grasses, forbs, shrubs, and woody plants processed at FS seed extractories in FY 1999.

Table 5 in Appendix A summarizes seed production area (SPA) status for FY 1999. No seed production areas were established in FY 1999; however, one SPA was eliminated resulting in a total of 5,218 acres in SPA status.

Genetic Resource Programs

Genetic resource improvement work is summarized in Tables 6, 7, 7A, and 7B in Appendix A. These programs make valuable contributions to improved forest health by identifying and conserving important genetic traits that control resistance to major pests, providing baseline genetic information for forest management activities using genetic test plantations and lab studies, producing adequate quantities of improved seed to meet demand, and by incorporating genetic principles into silvicultural treatment prescriptions and planning efforts.

The National Forest Genetic Electrophoresis Laboratory (NFGEL) is a facility dedicated to providing genetic analyses to resource managers throughout the agency. . Early NFGEL projects focused primarily on conifers, exploring genetic variation patterns to refine seed zones and to resolve questions about clones, populations, and genetic sources. More recently, following the development of the FS Genetic Resources Strategic Plan, NFGEL was given the mandate to begin work examining forest vegetation other than trees.

The National Forest Genetic Electrophoresis Laboratory (NFGEL) was established in 1988 as part of the National Forest System of the USDA-Forest Service. The purpose of the Laboratory is to analyze molecular genetic markers (proteins and DNA) in plant material submitted by Forest Service employees and those from other cooperating entities. NFGEL provides baseline genetic information, determines the effect of management on the genetic resource, supports the tree improvement program, and contributes information in the support of conservation and restoration programs, especially those involving native and TES (threatened, endangered, and sensitive) species. Early NFGEL projects focused primarily on conifers, exploring genetic variation patterns to refine seed zones and to resolve questions about clones, populations, and genetic sources. More recently, following the development of the FS Genetic Resources Strategic Plan, NFGEL was given the mandate to begin work examining forest vegetation other than trees.

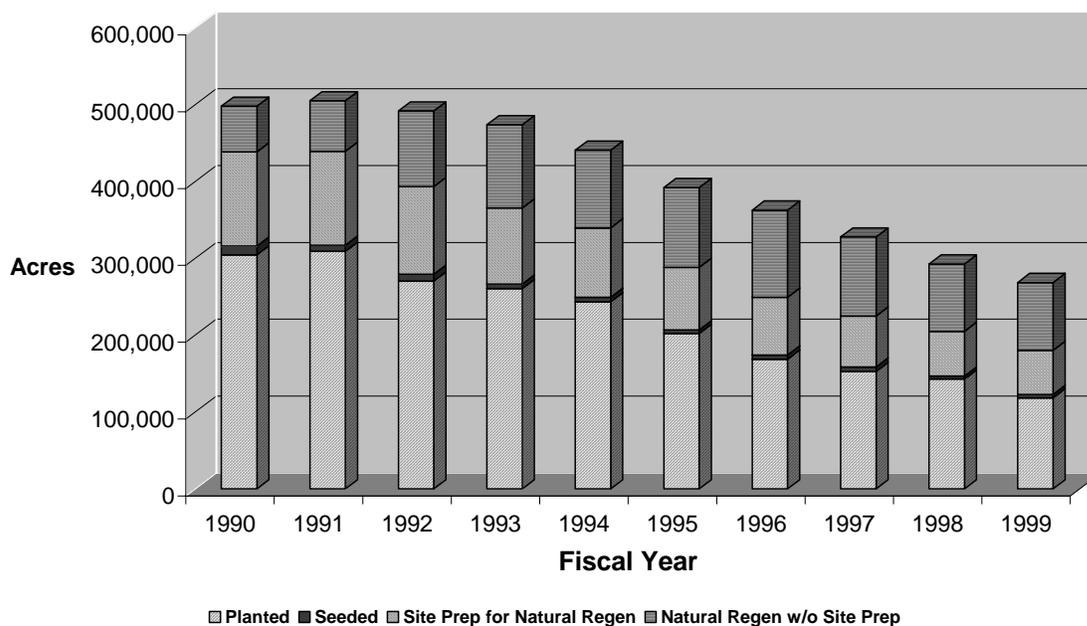
NFGEL projects were processed to meet a variety of management objectives. Project results were used to guide restoration and conservation projects, and assist in silviculture and tree improvement activities. During FY 99, the lab processed nine projects utilizing isozyme markers obtained with a combination of starch gel electrophoresis and isoelectric focusing. Five isozyme projects were in the area of silviculture and tree improvement. Project accomplishments included identifying contaminated sugar pine seedlots, determining the origin of an isolated limber pine stand as being planted by native Americans, determining the timing of bag application and removal in pollination of loblolly pine, and characterizing the genetic diversity and relatedness in blister rust resistant sugar pine seedcrops. Two projects addressed conservation and restoration were carried out in the isozyme laboratory. We characterized the genetic variation in the sensitive plant *Sisyrinchium sarmentosum* and postulated the effects of grazing on the conservation of the species, and we determined the origin of some taxonomically unknown cottonwood stands in the Pacific Northwest. The lab DNA technology was applied with the goal of matching a tree branch back to a tree. The DNA evidence will be used in a legal case to reconstruct the scene of a fire.

SUMMARY OF THE FY 1999 REFORESTATION PROGRAM

FY 1999 Reforestation Accomplishment and Program Trends

Over 267 thousand acres of National Forest System lands were reforested during FY 1999 using appropriated, reforestation trust (RTF), and Knutson-Vandenberg (K-V) funding sources. Contributed funds reforested an additional 1,507 acres, bringing the grand total for FY 1999 to 268,520 acres. This represents a reduction of about -8.3% from FY 1998 (292,902 acres). The distribution of these acres by the type of reforestation treatment is shown in Tables 9, 10, 11, and 11A in Appendix A. Included in the total for FY 1999 are 88,155 acres of natural regeneration without site preparation. Reforestation accomplishment by K-V funding occurred on a total of 158,618 acres, representing a -7.0% reduction from FY 1998 (170,596 acres). K-V reforestation acres continue to decline as a result of reduced harvest levels and a reduced amount of regeneration harvesting. National trends in reforestation accomplishment for the past 10 years are shown in Figure 3, illustrating the steady decline in reforestation accomplishment since FY 1991.

Figure 3 -- National Trends in Reforestation Accomplishment



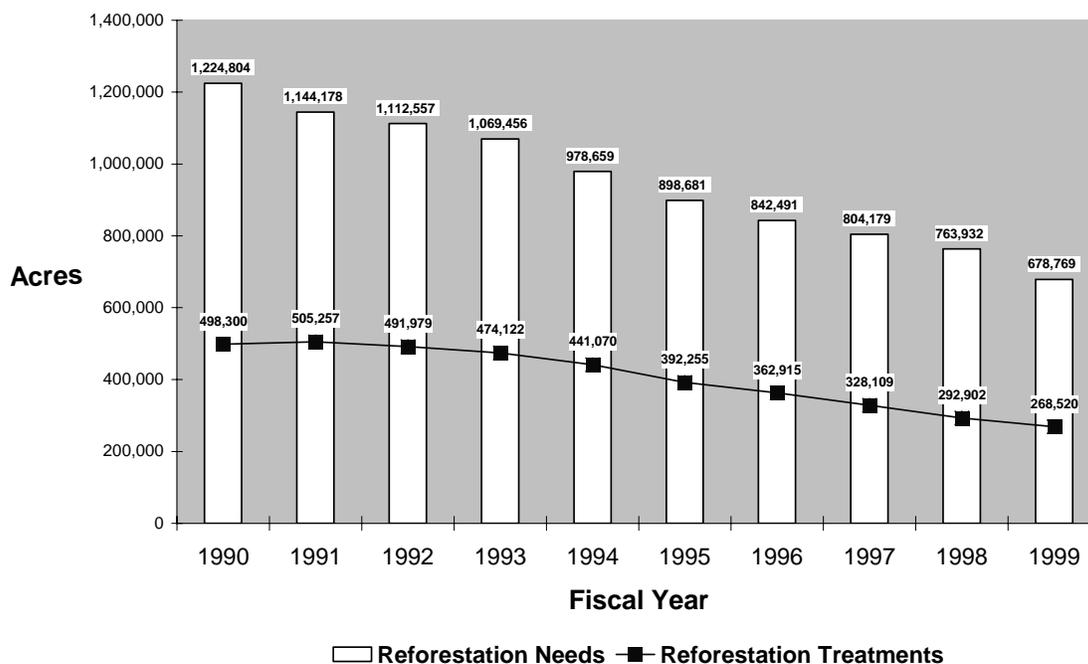
Additional information concerning reforestation accomplishments in FY 1999 is presented in Table 12 (Site Preparation for Planting or Seeding), Table 18 (Animal Control for Reforestation), and Table 21 (Certification of Reforestation treatments), as well as summary of harvest acres by cutting method in Table 20 in Appendix A.

FY 1999 Reforestation Needs and Trends

Current reforestation needs are estimated at 629,603 acres, representing about 2 years of reforestation work at present levels of accomplishment. It generally takes 2-3 years of lead time to prepare the site, grow seedlings adapted to specific sites, and make arrangements for getting the trees planted using either contract or force-account crews. Nationally, reforestation needs were reduced by about 49,258 acres in FY 1999. These needs have arisen as a result of regeneration harvest since the late-1980's and more recently from large wildfires in western regions and other disturbance events elsewhere. Fires added roughly 46,000 acres to national reforestation needs in FY 1999, up from fire additions reported in FY 1998 (15,000 acres).

National trends in reforestation needs are depicted in relation to reforestation treatments and reforestation failures in Figure 4. Reforestation failure rates remain low, with failures declared on about 21 thousand acres nationally in FY 1999 representing about 9% of reforestation treatment acres. More detailed information on reforestation needs is published annually in the Report of the Forest Service.

Figure 4 -- National Trends in Reforestation Needs



Plantation Survival and Reforestation Success

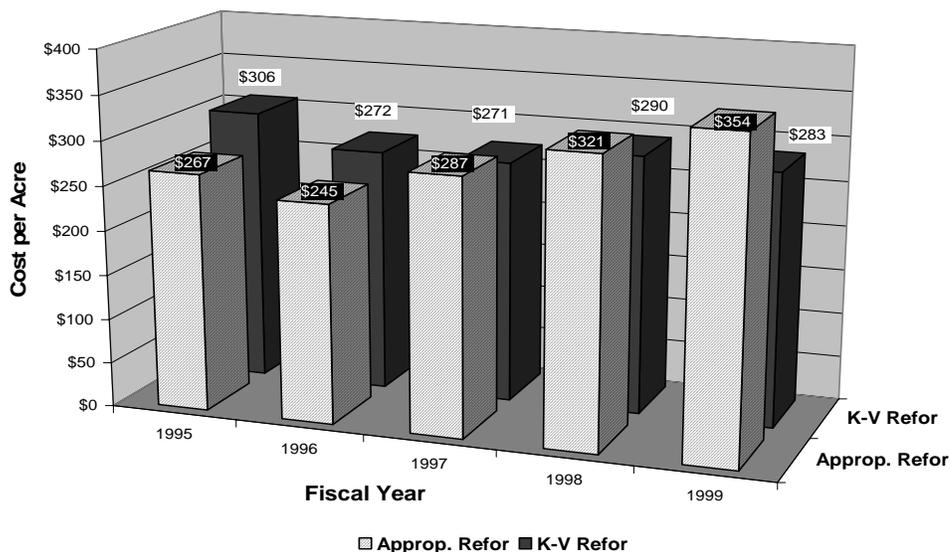
The results of the plantation surveys made following the 1998 growing season are summarized in Table 23 in Appendix B. First-year survival nationally averaged 74%, down by 2% from the prior year (76%). The national average for third-year survival was reported at 61%, decreasing slightly from rates of survival reported in the previous year (64%).

Reforestation Program Costs

Reforestation cost trends are displayed in Figure 6, showing the average cost of each acre of reforestation accomplishment for each of the past five fiscal years. The per acre costs shown in this figure were derived by dividing total obligations by the acres of reforestation work accomplished during each fiscal year. No adjustment for inflation has been made for any of the cost data included in Figure 6.

Nationally, reforestation costs rose in FY 1999 in relation to costs reported in the prior year. Reforestation treatments averaged about \$311 per acre for all fund types in FY 1999, an increase of \$8 per acre from costs reflected in NFC reports for FY 1998 (\$303 per acre). Average costs for appropriated reforestation work increased more, on a relative basis, than average costs for K-V work from FY 1998 to FY 1999. Higher-than-average reforestation costs are incurred in those regions which rely more heavily on artificial regeneration methods in order to successfully regenerate sites. The need to eliminate unwanted vegetation through site preparation and subsequent release treatments also contributes to an increased total cost in selected regions. By contrast, in regions where regeneration arises predominantly by natural means, average reforestation costs are typically less than \$100 per acre.

Figure 6 -- Average Costs for Reforestation Treatments

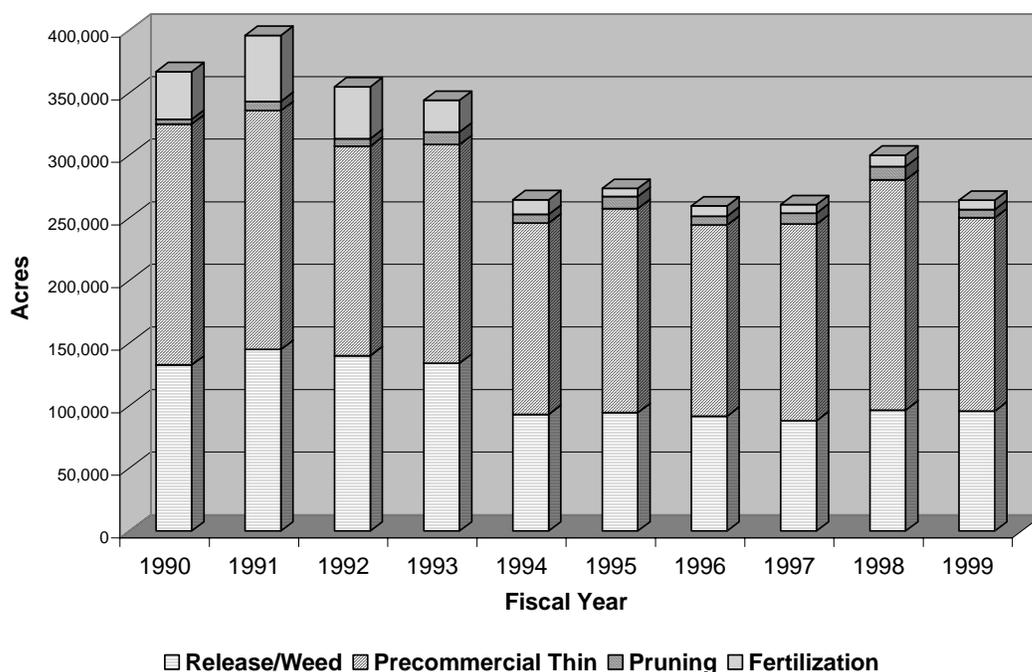


SUMMARY OF THE FY 1999 TIMBER STAND IMPROVEMENT (TSI) PROGRAM

FY 1999 TSI Accomplishment and Program Trends

About 263 thousand acres of National Forest System lands received TSI treatments during FY 1999 using appropriated, reforestation trust (RTF), and Knutson-Vandenberg (K-V) funding sources. Contributed funds treated an additional 1,396 acres, bringing the grand total for FY 1999 to 264,182 acres. This represents a decrease from FY 1998 (300,202 acres). The distribution of these acres by the type of TSI treatment is shown in Tables 13, 14, 15, and 16 in Appendix A. National trends in TSI accomplishment for the past 10 years are shown in Figure 7.

Figure 7 -- National Trends in TSI Accomplishment



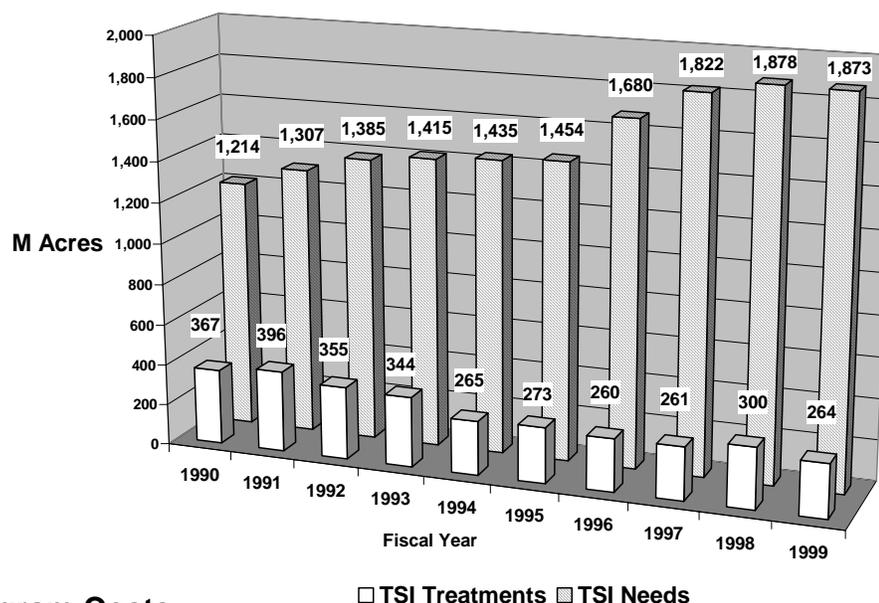
In contrast to the trends over the past year, TSI accomplishments have generally been declining since FY 1991 nationally. This decline is a reflection of reduced funding for vegetation management work and also reflects the impact of a series of bad fire years resulting in the need to apply a limited amount of appropriated funding to support reforestation efforts following these events. This need for this shift in emphasis impacted dollars that would otherwise be used to accomplish TSI work.

Additional information on TSI accomplishments is provided on Table 17 (Prescribed Burning to Control Understory Species), Table 19 (Animal Control for TSI), and Table 21 (Certification of TSI Treatments) in Appendix A.

FY 1999 TSI Needs and Trends

Current TSI needs are estimated at about 1.873 million acres nationally, a decrease of 4,855 acres over the TSI needs level reported in FY 1998 (1.877 million acres). FY 1999 TSI needs represent about 7 years of work at FY 1999 levels of accomplishment. The gap between TSI needs and accomplishments narrowed by a small margin for the first time this year. National trends in TSI needs and accomplishments are shown in Figure 8.

Figure 8 -- National Trends in TSI Needs and Treatments



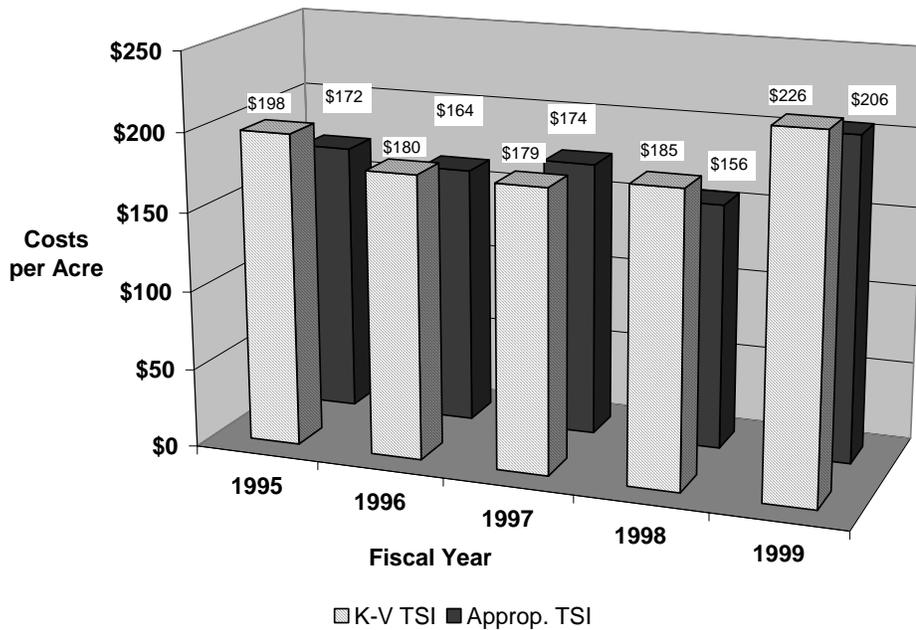
TSI Program Costs

TSI cost trends are displayed on the following page in Figure 9 showing the average cost of each acre of TSI accomplishment for each of the past five fiscal years. The annual per acre cost shown in this figure was derived by dividing total obligations by the acres of TSI work accomplished during each of the fiscal years shown. No adjustment for inflation has been made for any of the cost data included in Figure 9.

Nationally, TSI costs increased in FY 1999 in relation to costs tabulated in the prior year. TSI treatments averaged about \$214 per acre in FY 1999, an increase of about \$45 per acre from costs derived from NFC reports for FY 1998 (\$169 per acre). Appropriated TSI obligations rose on average by about \$50 per acre from FY 1998 to FY 1999, while K-V TSI obligations increased on average by about \$41 per acre on average during this same period.

Higher-than-average TSI costs are incurred in those regions where the TSI program includes a high proportion of release work relative to other types of TSI work. Lower-than-average costs typically reflect an emphasis on pre-commercial thinning. The average TSI cost increases experienced from FY 1998 to FY 1999 are in part attributable to a higher proportion of more costly release and pre-commercial thinning work in the program in FY 1999 than was the case in FY 1998.

Figure 9 -- Average Costs for TSI Treatments



FINANCIAL SUMMARY OF THE KNUTSON-VANDENBERG (K-V) PROGRAM

The disposition of K-V accounts by region are shown in Table 24. FY 1999 K-V collections declined by about -5.5% from FY 1998 collection levels (\$116,225). K-V obligations were roughly \$149 million in FY 1999, up by about 2.2% from FY 1998 spending levels. As of the end of FY 1999, a total of about \$292 million in Emergency Forest Service Firefighting (EFSFF) advances needed to be repaid in order to carry out the work authorized on K-V Sale Area Improvement (SAI) plans. Repayment of these advances remains a critical management concern. Trends in K-V collections and obligations from FY 1931 through the end of FY 1999 are shown on Table 23.