

NIFRMA Task B - A survey of the condition of Indian forest lands, including health and productivity levels.

The ability of the land to sustain the people is at the core of long-term tribal success, and that ability is based on: 1) the extent and productivity of the tribal land base over time, and 2) its sustainable management within the context of its social and ecological landscape. *Forests* are defined as land areas having >10 percent cover of tree species (consistent with earlier IFMAT reports) and *woodlands* as 5-10 percent vegetative cover in trees. *Condition* of that forest or woodland is defined as the existing composition and structure of the resource. Forest and woodland *health* is defined as the ability of that resource to naturally resist disturbances and/or consistently demonstrate resilience to those disturbances, both natural and anthropogenic. Forest *productivity* is defined as the ability of the forested land base to meet the needs of the tribe in terms of identified and desired ecosystem services. Forest cover and the standing crop of trees are surrogates for these broader concepts of condition, health and productivity given the limited availability of monitoring data for other attributes (e.g., fuel loading and/or habitat features). *Commercial* forests and woodlands are a subset of the total land base referring only to those acres able to be accessed and productively managed.



Pine overstory retention to rehabilitate formerly degraded commercial forest lands - Penobscot. Photo by Larry Mason.

Data for this assessment of forest/woodland condition and health were available from the tribes and their respective management plans, the BIA's FPA, the USFS FIA and forest health Aerial Detection Survey (ADS) programs, the DOI's LANDFIRE program, and the Quadrennial Fire Report (QFR). All of these data draw on a range of sources from surveys of land managers to satellite imagery, but have been consistently aggregated to fairly large scales with coarse resolution. These data have furthermore been summed or averaged by BIA Region for this

report. Hence, none of the findings and recommendations can be applied to specific tribes or their specific acreage and/or their specific project-level planning and activities.

We assessed condition, health and productivity by examining trends in total acreage managed by region, tree density and standing volumes of wood on those acres, age and size distributions, net growth and forest mortality rates, aerial detection surveys of disease/insect injury to US forests, and fire statistics. Comparisons are made to the condition, health and productivity of lands managed within the National Forest System of the USFS, as well as lands managed by all other federal forest lands combined, state and local governmental agencies, forest industry (including Timber Investment Management Organizations), and small private landowners. These data are augmented by reviews of planning documents from the BIA and tribes, lengthy discussions with practitioners, and personal observations from the 20 site visits.

Background

Past findings, concerns and recommendations

- 1) There has been a loss in forest resources across regions and forest types, with specific concerns about:
 - a. Loss of diversity and complexity in forests and woodlands as classified into five broad categories: ponderosa pine, mixed (western) conifer, pinyon-juniper woodlands, Northwest coastal conifer, and eastern hardwood-conifer forests;
 - b. Watershed-scale impacts of human population expansion (and resulting fragmentation), road construction and delayed maintenance, and invasive/exotic animal and plant species across all five categories; and
 - c. The inability of the BIA/tribes to monitor and effectively manage the resource comprehensively given the lack of data, staff and finances particularly for woodland management.
- 2) There were emerging severe and large-scale issues with forest health and wildland fire, the ability to continue to implement sufficient preventative fuels treatments and/or adequate suppression capabilities, and the impact of declining forest condition on/among neighboring lands. Drier forest types and woodlands were identified as important in many of the western landscapes but frequently under-managed.
- 3) An added concern is climate change (discussed separately in this report).

Earlier recommendations therefore focused on the development of integrated resource management strategies (and associated planning documents), concurrent staff development and funding, hazardous fuels reduction treatments integrated with a range of management approaches (e.g., wildlife habitat enhancement and “ecosystem management”), extensive monitoring, watershed restoration including road system enhancements and riparian restoration programs, expanded woodland management, and some targeted independent

studies. Progress was noted in a few of these areas in, but most issues and recommendations remained after those ten years.

Current findings regarding forest condition

Tribal forest lands held in trust and excluding Alaska have increased by 16 percent (2.8 million acres) across the four BIA regions over the twenty years since IFMAT I, with the largest increase occurring from additions of noncommercial woodlands in the Southwest (Tables B.1-B.4). As tribes assume greater self-determination and self-governance, they are voluntarily increasing no-harvest reserves for perceived environmental and cultural protection. In 1991, the percentage of forest land in reserve was 4.5 percent (719,812 acres). By 2011, that percentage had grown to 5.9 percent (1,096,955 acres). Although total forest lands have increased, commercial forests and woodlands as a percentage of the total lands have decreased. Commercial forests and woodlands represented 53.5 percent of Indian forests in 2011, down from 63.5 percent in 1991. Looking only at commercial timberland, the percentage cover declined from 35.8 percent to 32.5 percent over the same 20 years although the actual acreage increased 366,335 acres.

The standing volume on tribal commercial forest lands (as measured in board feet) has increased in the Eastern and Northwest Regions by 5 and 11 percent, respectively, in the 20 years since IFMAT I but decreased in the Lake States by 24 percent through loss of forestland acres and the actions of disturbance agents. The Southwest Region was stable through 2001, but significant fire events (e.g., the Rodeo-Chediski and Wallow Fires) since then have reduced standing volumes considerably; there is not sufficient clarity in the database to make a numerical estimate of volume lost.

Forest density as measured by basal area, which combines both number of stems and their respective size, is consistently lower on tribal lands than on national forests, but the magnitude varies by region (Figure B.1). The greatest differences are in the Northwest, where tribal forest density is less than other federal lands and state/local governmental lands. Tribal lands typically have basal area/acre that is most similar to (but generally greater than) industrial and/or small private ownerships lands. These broad differences, however, must consider differences in site quality, age distributions and disturbance patterns – all of which influence landscape-level density/stocking. Considering that these lands are less productive inherently (see finding B4) and that harvest levels have been reduced in the last decade, much of this pattern can be explained by stand age (see finding B6).

Annual productivity by acre (growth), on average, is lower on tribal lands than all other lands in the Eastern and Lake States Regions – though state/local governmental lands are similar (Figure B.2). In the Northwest, tribal forestlands are less productive than all lands except for national

forest lands, likely due to elevation and legacy challenges created by former mismanagement. In the Southwest, however, tribal lands are the most productive in the region. This pattern may reflect the history of how lands were allocated, purchased and/or held during the 19th and 20th Century (the “value” of the land in terms of soils and climate and associated species) rather than any loss or gain of productivity through management.

We saw no evidence of recent loss of productivity on tribal lands; indeed, the high productivity and comparative resilience of tribal forests in the Southwest Region appears attributable to sound, active management using uneven-aged approaches. In the Lake States and Eastern regions, most tribes are continuing to rehabilitate the standing stock and productive capabilities of their land.

Forest mortality rates can influence productivity rates, and mortality rates have been periodically high in some regions and ownerships over the last decade (Figure B.2) particularly on Forest Service lands and in the West. Only in the Lake States Region are tree mortality rates on tribal lands comparable to the national forests, and these data are confirmed by aerial detection survey data trends over the last 14 years (Figure B.3). The spike in insect and disease damage in 2001 and 2002 in the Lake States is attributed to the gypsy moth.

The age distribution of forests on tribal lands are currently most similar to federal, state and local governmental lands (Figure B.4) in terms of the relative percentages of young, early-seral conditions to mature stands to older stands; industrial and small private ownerships have higher proportions of young stands likely reflecting more frequent harvests rather than any natural disturbances. Tribes have a considerable percentage of their lands in older stands, at or above that of the USFS *except* for the Northwest region (given 20 years of the Northwest Forest Plan).

The pattern of more older forests in the Southwest, with two-thirds of the landscape in stands >100 years, is likely tied to a higher percentage of the land well managed using uneven-aged silvicultural principles, which would produce the “old” age class designation in these FIA data but actually reflects a balanced age distribution maintained by active management (with high per acre productivity and low insect/disease mortality as noted above).



Sequoia forest – Tule River. Photo by Larry Mason.

Figure B.1 Basal area by ownership and region; timberlands.

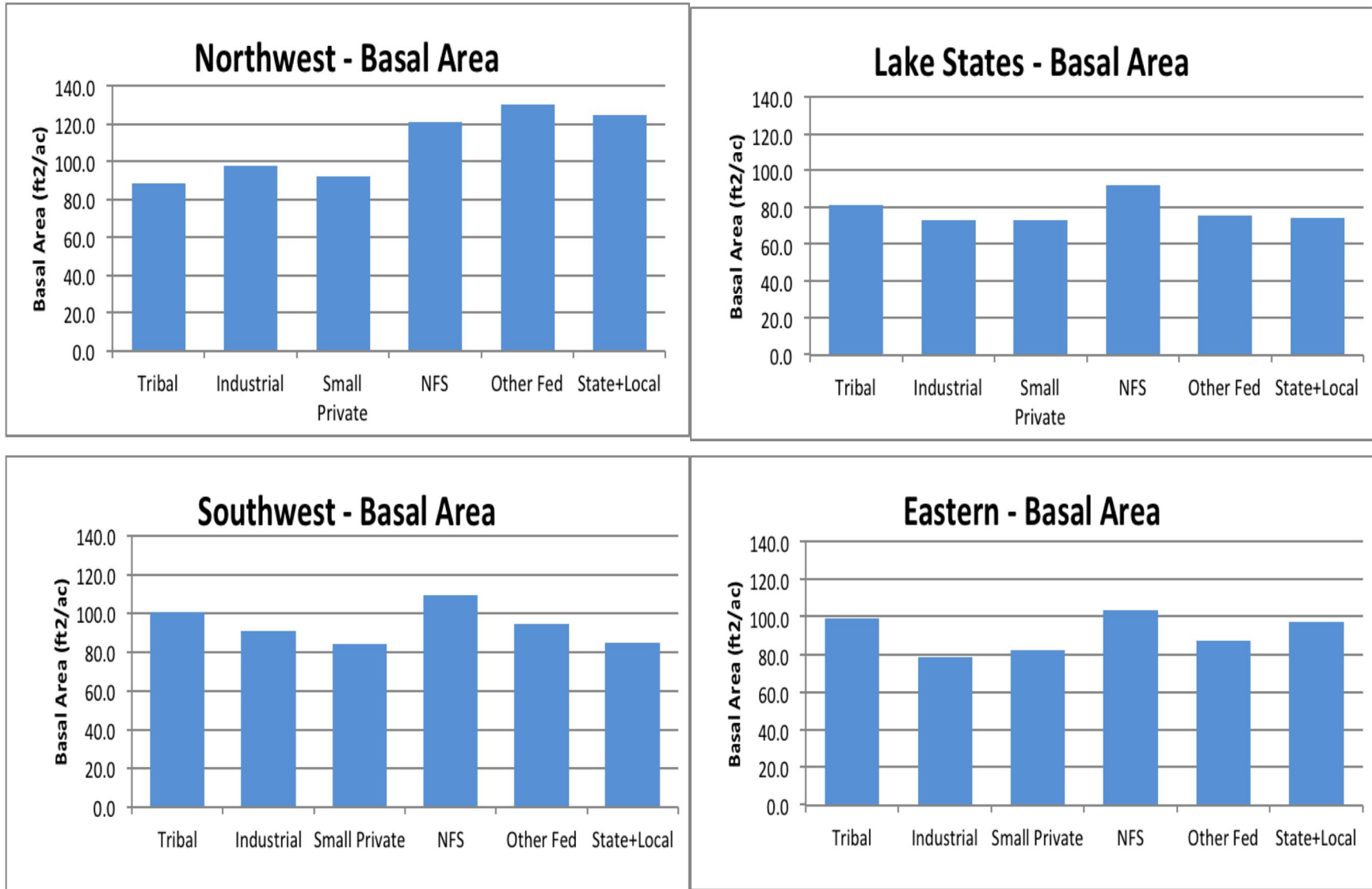


Figure B.2. Net growth and mortality as measured in board feet/acre/year for timberlands across ownerships by region.

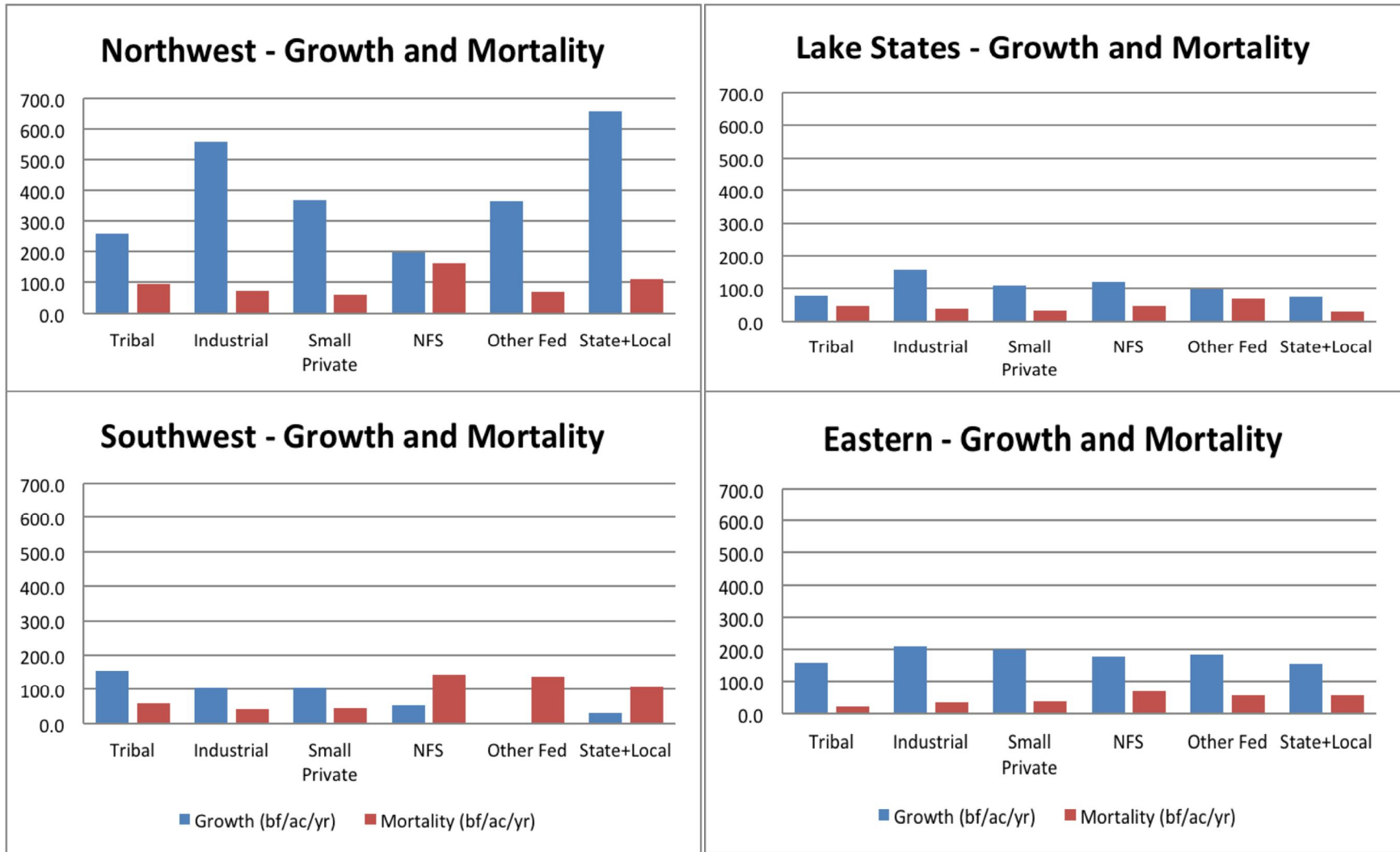


Figure B.3. Aerial detection survey: % of land area affected by ownership and region.

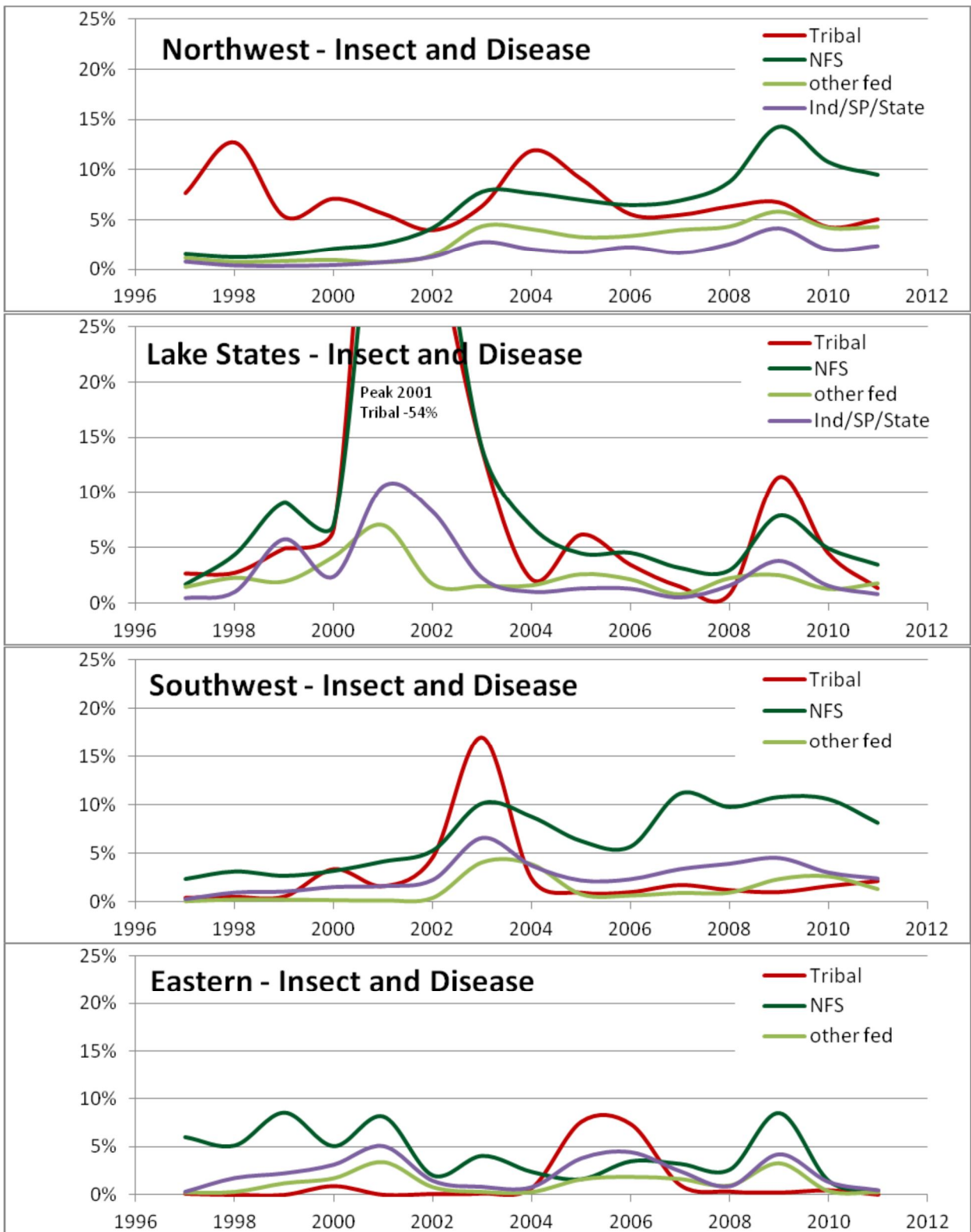
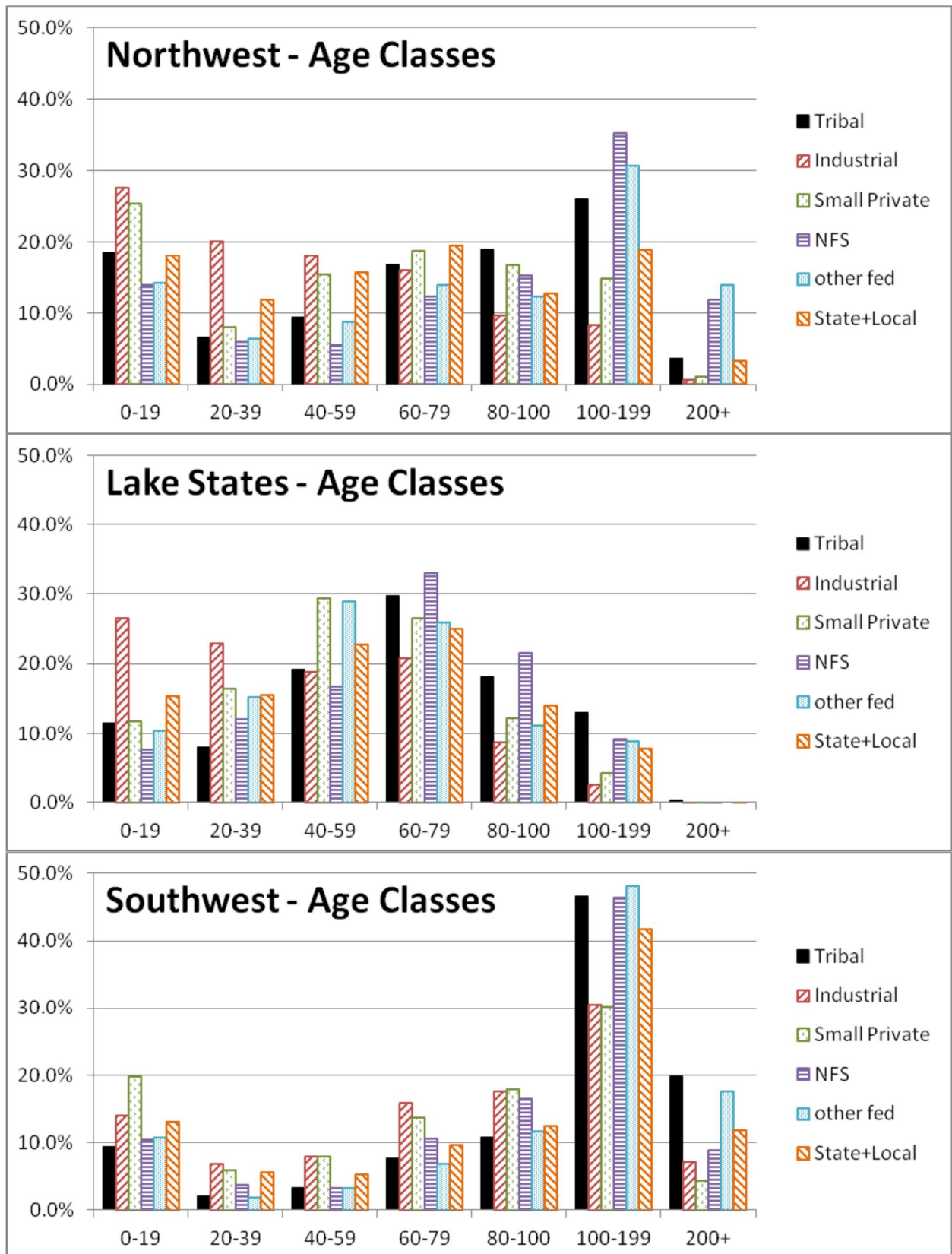
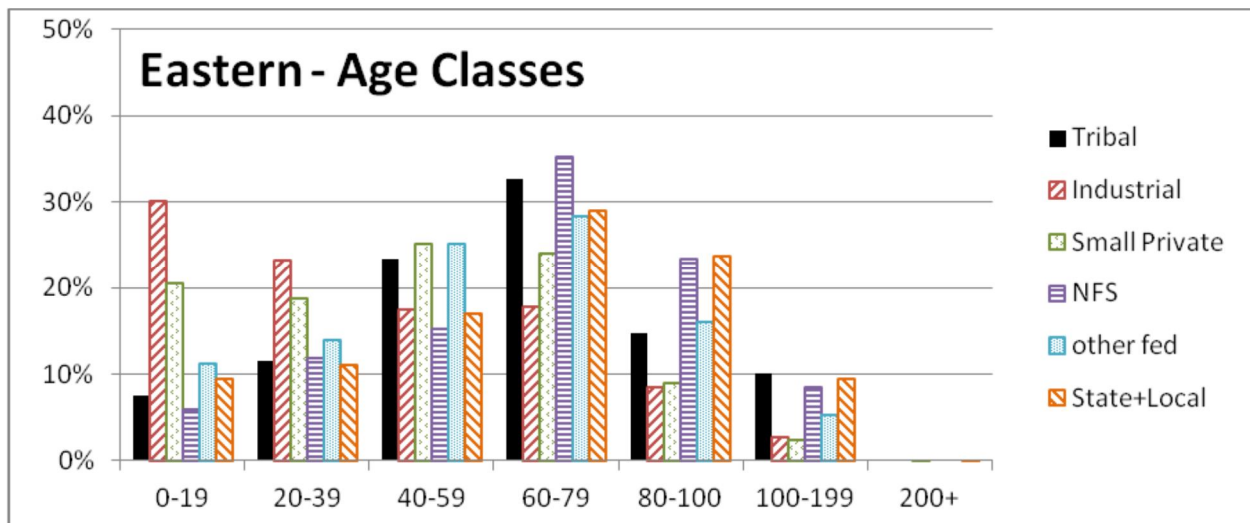


Figure B.4. Age distribution by ownership and region (x axis reflects age classes).

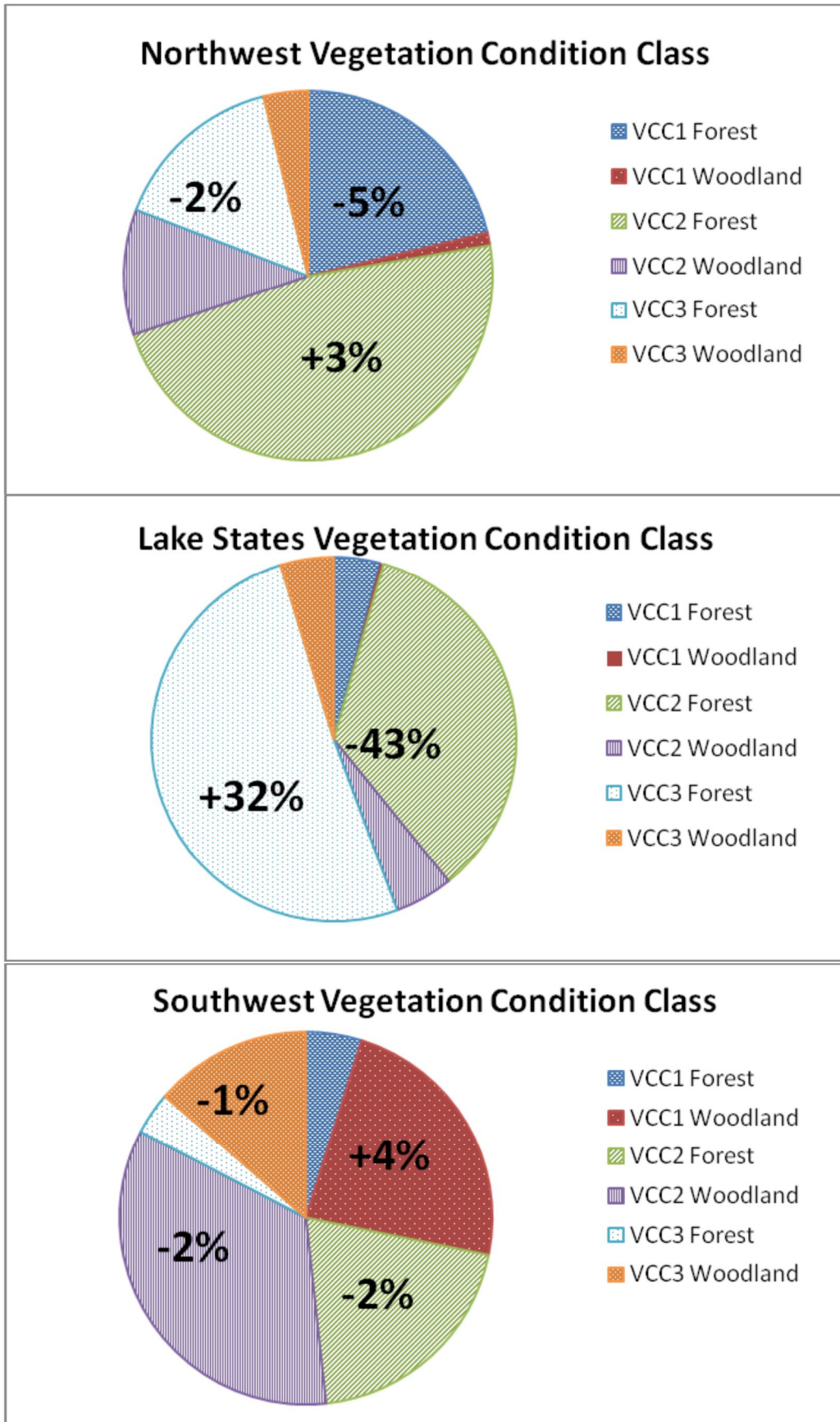


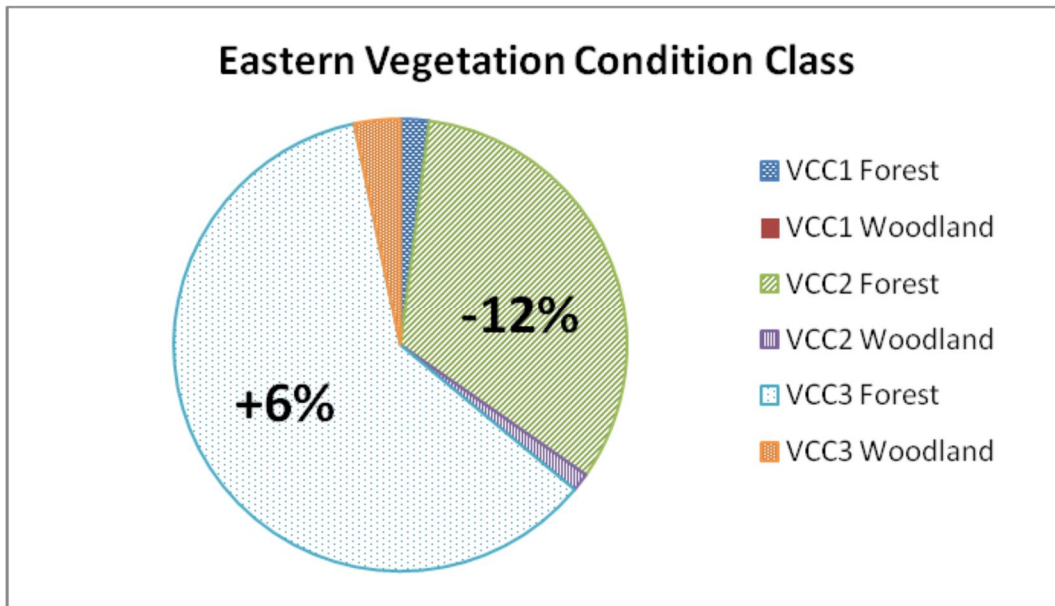


The tribes have been very successful at demonstrating the ability of pro-active forest management to create/maintain a full range of seral conditions within a landscape, including older stands and large trees, while minimizing forest health issues through density management and creating resistant and resilience structural conditions.

The condition of tribal forestlands has declined in the East and remained relatively stable over the last decade in the West based on DOI LANDFIRE analyses (Figure B.5). In the LANDFIRE System, Vegetation Condition Class 1 (VCC1) refers to pixels/acres classified as being in a natural structural condition for that forest type based on remote sensing data and supported by ground plots (e.g., FIA); Vegetation Condition Class 3 (VCC3) refers to a significant deviation from structural characteristics associated with resistant and resilient forests (particularly in terms of fire hazard), with VCC2 being an intermediate classification. In the relatively small Eastern region, VCC3 forest (high risk) now represents 61 percent of tribal acres, an increase of six percent from 2001 to 2008, with most of the acres shifting from VCC2 condition. There are considerably more acres of tribal land in the Lake States region and those lands also showed an increase in high risk classification, with 51 percent of forestlands now in VCC3 (37 percent increase). In the Northwest region, both VCC1 (low risk) and VCC3 (high risk) forestlands have declined, and the dominant classification is now the intermediate VCC2 (47 percent of tribal ownership); this makes an assessment of condition difficult from these data. The Southwest region is similarly dominated by VCC2 lands.

Figure B.5. LANDFIRE analyses of tribal land showing the distribution within each region for VCC 1-3 with percent change from 2001 to 2008 indicated for key forest types.





Findings

B1. On the whole, the health and productivity of Indian forests are being maintained, but forest density-related threats from fire, insects, disease, and climate change have and increasingly will compromise the long-term sustainability of Indian forests unless treatment measures are accelerated and appropriate annual harvest targets can be met. Overly dense stands—legacies of past management practices—exist on large acreages of Indian forests. The hazard posed by these dense stands and the continuity among fuels in the landscape represents an emerging fire management paradox, defined by strained financial and human resources attempting to suppress wildland fire, along with declining abilities to proactively treat fuels.

The good practices now instituted on many Indian forests need to be maintained and accelerated. Accelerated treatments could ideally be extended to adjacent federal forests that, in many locations, are untended, overstocked, and pose a threat to tribal resources.

B2. Progress continues in innovative silviculture, integration of forest management for a range of values, and in the presence of quality staff. We observed evidence of effective forestry in each region, including strip harvests to regenerate birch in the Lake States, cable thinning and pre-commercial thinning for density management in the Pacific Northwest, effective fuels management and juniper density reduction in the Southwest, and hardwood pulp removals to re-establish pine dominance in the Northeast. Extended rotations and uneven-age management dominate tribal forest practices. Several locations demonstrated the effective use of integrated resource management plans. Scarce resources, however, continue to impede development of multi-resource management plans envisioned by NIFRMA. Backlogs of forest development activities, such as planting and thinning, have decreased since IFMAT I, but still remain at 750,000 acres (Figure B.8 as reported by the

annual Indian Forestry Status Report to Congress), and compromise the resource potential of Indian forests.

- B3. Tribal forest and woodlands have remained largely intact** across the regions, and have increased nationwide in the 20 years since IFMAT I.
- B4. Standing timber volumes have increased in most regions** due to uneven-aged management, extended rotations, and reductions in annual allowable cut. Tribes actively manage their lands and regulate forest health, but typically harvest less volume than is growing (i.e. do not meet their designated AAC) given broader management objectives and declining access to markets. This finding suggests that review of the appropriateness of AAC as a priority management objective may be warranted.
- B5. Total wood volumes and stand densities are comparable to small private and industrial landowners, and typically lower than that on federal lands.** In many regions lower standing volumes on tribal as compared to federal forests may be related to effective stocking reductions to reduce fire hazard.
- B6. Annual forest growth on tribal forest lands varies by region** consistent with the quality of the land on reservations. Productivity of tribal forests in the Southwest appears to exceed that of other regional landowners.
- B7. We saw no evidence of unique or unusual forest health issues on tribal lands.** In some areas dense stands and continuous fuels pose significant risks to long-term sustainability, but these are concerns common to most forest ownerships. In many cases, tribal forests benefited from pro-active management and were often found to be in better condition than neighboring federal lands.
- B8. Tribes clearly demonstrate the ability of pro-active forest management** to create or maintain a full range of seral conditions within a landscape, including high proportions of older stands and larger trees, while minimizing forest health problems through density management. The economic and environmental benefits of investments in fuels reductions and density controls are well-documented in the forestry literature.
- B9. Long-term sustainability of these lands is fundamental to the tribes** and their culture, different from many neighboring lands, offering motivation and insight for innovative approaches to forest management.
- B10. Insect epidemics and stand-replacing fires**, dominant forces for creating young forests in the western regions over the last decade, have not impacted tribes as heavily as federal lands. Pro-active land management likely plays a role in this pattern at multiple scales.

B11. Tribes will be caught in the emerging fire management paradox, with strained financial and human resources attempting to suppress wildland fire, declining abilities to proactively treat fuels, and increasing fire risk in light of climate change and human expansion into the forest. Specifically, the hazard posed by dense stands and the continuity among fuels in the landscape, often aggravated by conditions on adjacent federal forests, represents a significant risk to the long-term sustainability of these forests.

Recommendations

B1. Continue to improve tribal inventory and monitoring capabilities (e.g., staff and funding) to ensure local and comprehensive understanding of resource productivity, health and potential to meet the needs of tribes.

B2. Continue to focus on implementing sound, state-of-the-art silviculture in response to the challenges of multiple-use management and current/emerging issues in Indian Country; for example, creatively meeting multiple economic and ecological objectives, efficiently handling small diameters and secondary species, and placing the treatments in a culturally palatable arrangement for tribal members.

B3. Exercise the entire silvicultural toolbox to address these challenges and meet the objectives of the tribe, including the expanded use of prescribed fire and chemicals where appropriate. This will require trained staff, adequate funding, and sufficient technical support.

B4. Add staff, funding, and technology to address emerging issues associated with human expansion into the forest: exotic/invasive plant and animal species, land trespass/safety, climate variability, watershed protections, threats to cultural resources, and wildlife management.

B5. Create heterogeneity in the landscape in terms of forest types, age/size of trees, and structural conditions that fit appropriately to the topography, reflect a tribal vision for diverse ecosystem services, and increase landscape resiliency to climate change.

B6. Avoid the tendency to not manage (or to manage only by constraints) over large expanses due to issues associated with wildlife habitat, watershed protection and other non-timber values; less management might be a viable alternative in the near-term but carries a long-term risk, particularly from wildland fire, exotic and invasive pests, and climate change.

B7. Continue the relocation, improvement and maintenance of necessary road systems to protect watersheds and, where possible, regulate access to preserve road

integrity, reduce fire ignitions and trespasses, and minimize the spread of exotic/invasive plants and animals.

B8. Continue to coordinate with other natural resources disciplines to achieve related goals most efficiently. We saw outstanding examples of such collaboration, and it is the future of land management in general and particularly for woodland management.

B9. As both previous IFMAT reports recommended, expand staff and funding for woodlands management, which represents the most acreage in Indian Country and contains many of the most pressing management issues (e.g., fire risk, watershed protection, exotic species, and climate change).

B10. Promote the inherent connection of tribal human communities, including the land management professionals, to the resources being managed within the tribes and in the media. This connection is often unique among landowners and fundamental to the need for sustainability.

The changing fire management paradigm

Wildfire has become a dominant management concern across much of western U.S. in the 20 years since IFMAT I, and a great deal of money and staffing has been allocated during the last ten years through the National Fire Plan for both preparedness and suppression. Though wildfire impacts a relatively small percentage of tribal acres, less than one-half percent per year (QFR 2009), when wildfires do occur the impacts can be devastating for tribes. Fire is a growing physical, economic and ecological problem for tribes, especially where adjacent national forests create high risk of intense wildfires. The passage of the TFPA in 2004 was an attempt by Congress to address this hazard exposure to tribal resources. Under TFPA agreements tribal forestry program would contract with federal agencies to reduce fuel loads on federal lands that threaten tribal resources. To date TFPA projects have been tentative and inadequate (ITC 2013). Nationally, the number of acres burned per fire, the total acres of uncharacteristically severe fires, and the dollars spent on suppression are all on the rise (Figures B.6 and B.7). Fire ecologists and national planners are now referring to the large fires of the last decade as "Mega-Fires." Climate change is expected to increase the frequency, intensity, and magnitude of wildfires two to six times depending upon the region and forest type (Climate Central 2012).

In recent years, steadily increasing suppression costs have begun to undermine the availability of funds to invest in hazardous fuels reductions treatments as total fire dollars are generally declining across agencies including the BIA. The lack of markets for small-diameter wood products and biomass further hamper the ability of tribal forest managers to treat fuels over significant areas, though, to date, they have generally been more effective than their neighboring federal lands. We saw several stark examples of neighboring high-risk lands during IFMAT visits

to forested reservations. Tribes undoubtedly will be caught in the emerging fire management paradox, though, with strained national financial and human resources attempting to suppress wildland fire, declining abilities to proactively treat fuels in a meaningful way across landscapes, and increasing fire risk in light of climate change and human expansion into forests and woodlands.

Tribes continue to be challenged with limited budgets and a residual backlog of work to properly manage their lands: planting, thinning and fuels treatment. Nearly 750,000 acres, four percent of their ownership, is in backlog for planting and thinning (BIA 2012d). These acres have decreased since IFMAT I given regular management efforts and/or the natural development of forests and woodlands. Additional challenges to implementing state-of-the-art forestry emerge from: 1) a lack of regional support in terms of nurseries and planting stock for reforestation; 2) a lack of markets for small-diameter wood, chips and/or biomass that can offset the costs of much of the thinning and fuels management backlog; and 3) a reluctance to use prescribed fire and herbicides to most efficiently achieve management objectives in many areas.

Tribal forest managers, particularly in the West, are well aware of the growing problem of fuel accumulations (especially on federal lands) in terms of amounts and contiguity, increasing duration and depth of fire seasons, and increasing risk of fire given human expansion into and around forests and woodlands. There has been an increasing trend both in the acreages burned by forest and woodland wildfires each year (NIFC 2012) and in the associated costs (OPA 2012) of the national response (Figures B.6 & B.7).

The reality of these numbers and the sense of foreboding emerging among fire managers, however, have failed to produce a realistic solution to a series fire appropriations issues:

Fire-related findings

BF1. Funding formula/systems such as Minimum Expected Level (MEL) are outdated and inconsistent among and within agencies. The BIA BOWFM estimates that they are operating at 50% MEL currently – the HFPAS, designed to improve fire funding allocations, does not address fundamental issues and is vulnerable to “gaming the system”.

BF2. Under the FLAME Act, suppression funding is legislatively based on a 10-year running average that continues to climb each year given the increasing amount of wildland fire. Suppression is the priority funding allocation amongst fire programs. Increasing suppression allocations therefore displace funding needed for other programs such as fire preparedness, hazardous fuels management, and burned area emergency rehabilitation (BAER). Logically, as dollars for hazardous fuels reduction activities decrease, then fire

hazard increases resulting in greater wildfire activity and suppression costs. A vicious cycle of crisis management therefore ensues with suppression expenditures consuming ever more of the funds that otherwise might be used to regulate future wildland fires.

BF3. BIA Branch of Wildland Fire Management struggles to maintain a workforce and funding for routine operations, while workforce retirements, loss of institutional knowledge, and declining infrastructure erode ability to respond to crisis incidents.

BF4. Fire professionals require a long-tenured accumulation of trainings, qualifications, and certifications. BIA lacks the ability to plan for and hire GS-5-7-9 positions, and disproportionately must fill positions with emergency hires of temporary workers.

BF5. There is a growing backlog of equipment, facilities maintenance and construction upgrades identified by BIA with no indication of opportunity for address in the foreseeable future.

BF6. If land managers are truly going to use fire as a tool and/or restore ecosystems and/or reduce landscape-level fuel accumulations, then they typically need to be treating five to ten times the amount of acres they have been treating annually over the last decade yet hazardous fuels funding continues in decline.

BF7. Given that humans ignite about 80% of fires on Indian lands, investment in education programs and law enforcement are warranted.

Fire-related recommendations

BF1. Revise federal fire funding allocations, that currently appear insufficient and unreliable to fulfill federal obligations to protect Indian forests, foster inequitable distribution amongst competing agencies, and foreclose opportunities to reduce future wildland fire risk by shifting resources to suppression rather than hazard reduction.

BF2. Increase federal support for BIA Branch of Wildland Fire Management to address growing backlogs in facilities maintenance and equipment needs as well as shortfalls in education, law enforcement, and recruitment of qualified staff.



Crown fire. Photo provided by Robyn Broyles.

Figure B.6. The number and acres burned of wildfires in the United States 1960-2011.

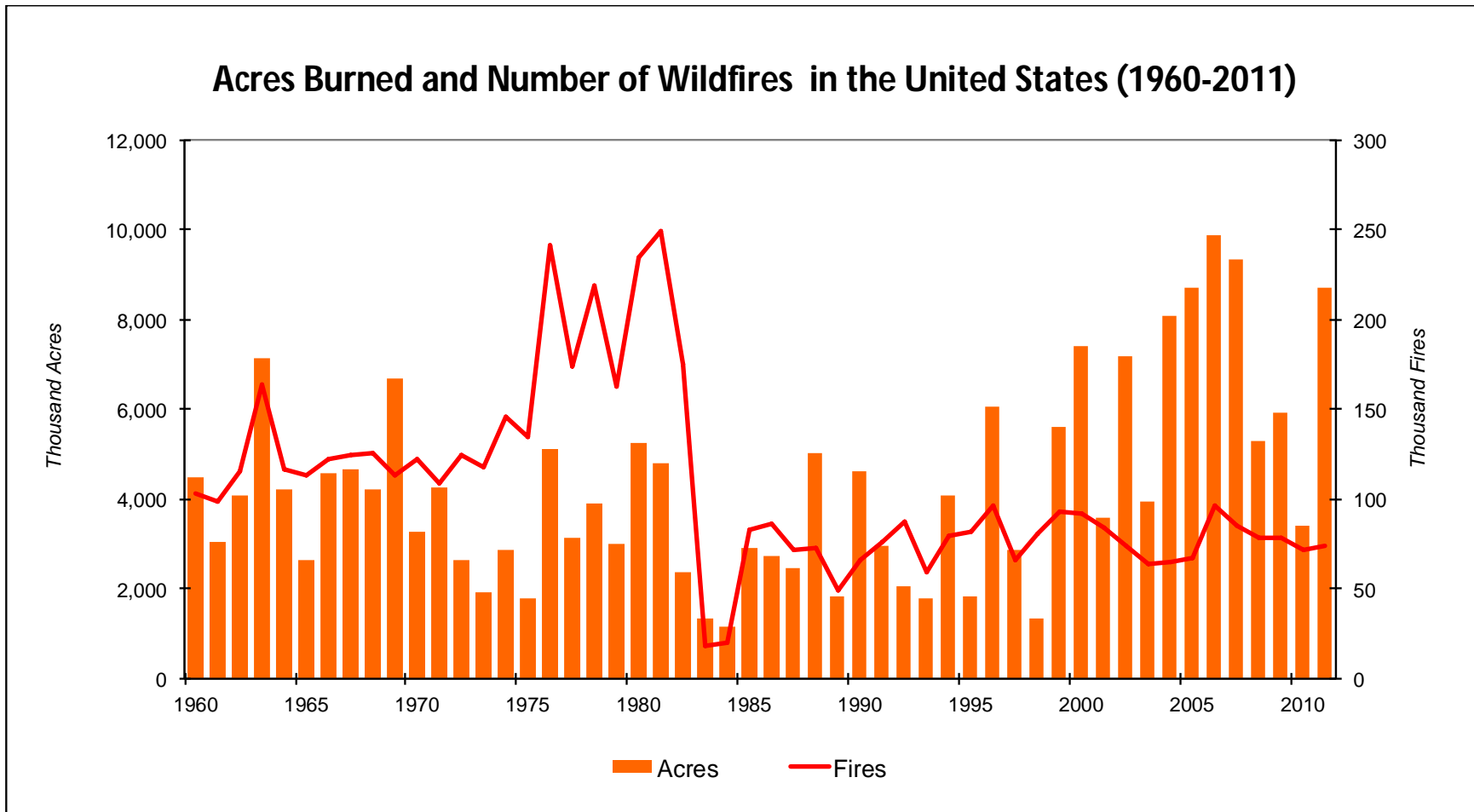


Figure B.7. Wildfire suppression costs in the United States from 1985-2012.

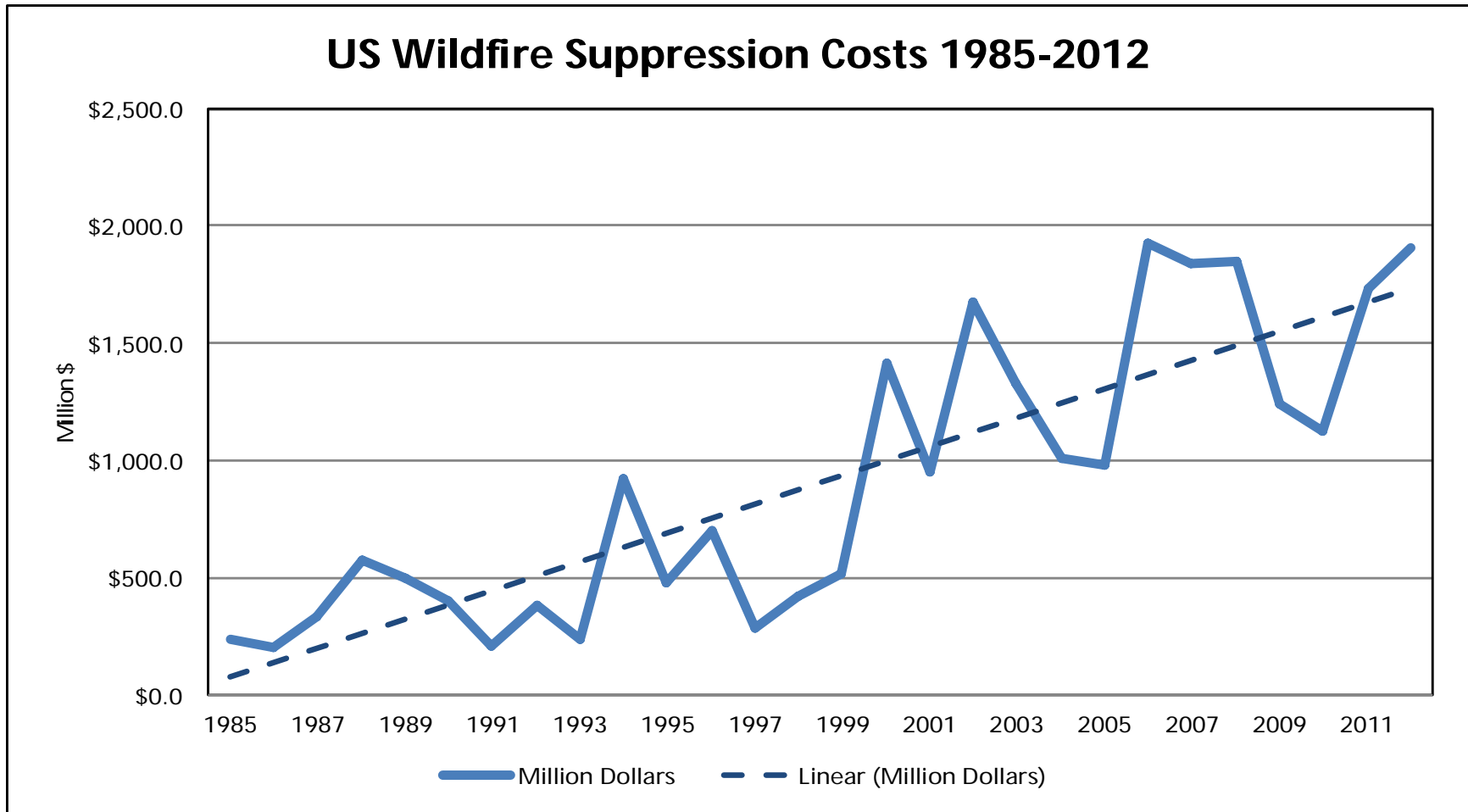


Figure B.8. Planting and Thinning backlogs on Indian reservations.

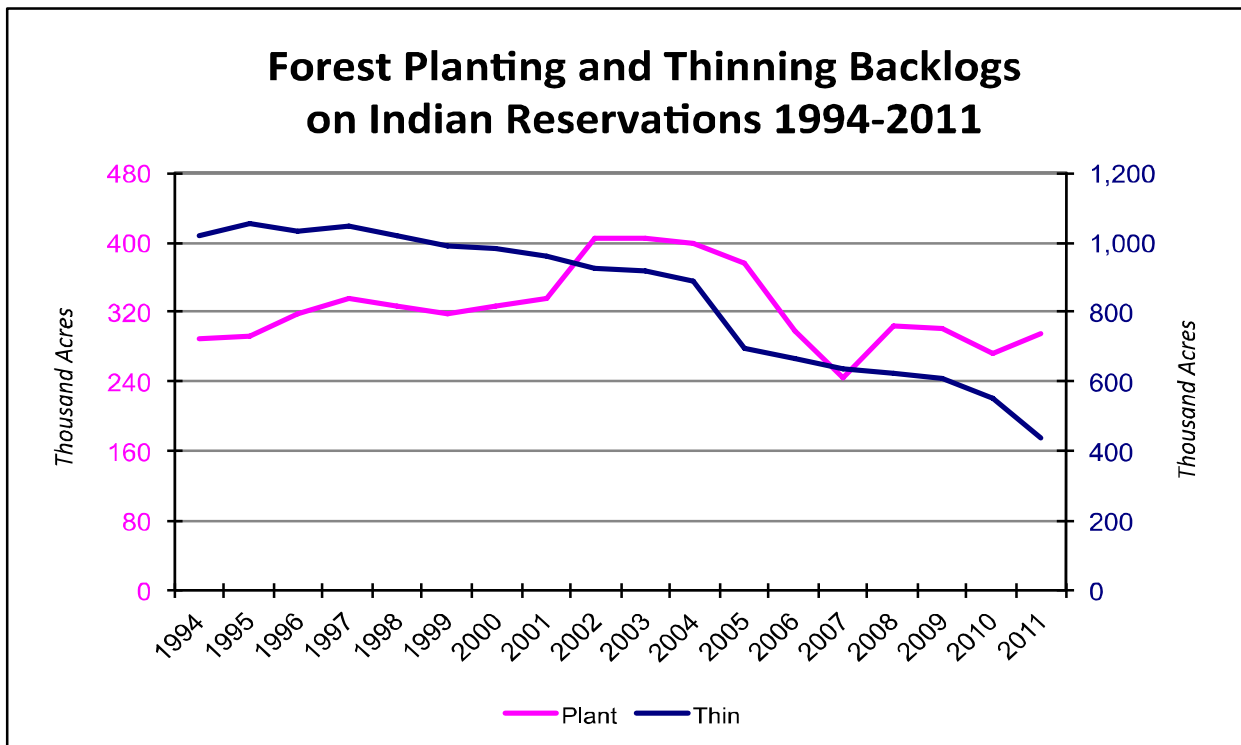


Figure B.9 Acres Treated and HFR Funding (inflation adjusted 2011\$).

