



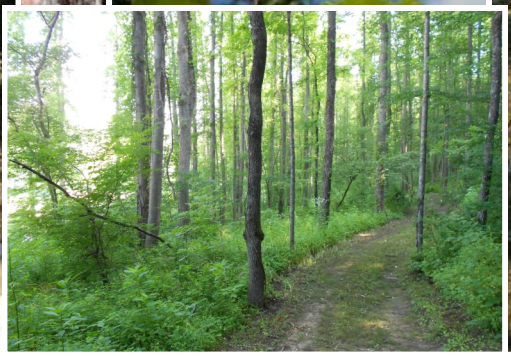

Assessment of Indian forests and forest management in the United States

Final report, Volume 1

2013

The third Indian Forest Management Assessment Team for the Intertribal Timber Council June 2013

An assessment of Indian forests and forest management in the United States

Final report

Volume I

2013

By the Indian Forest Management Assessment Team
For the Intertribal Timber Council

http://www.itcnet.org/issues_projects/issues_2/forest_management/assessment.html



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1996-2011, Chair, Conservation Committee of the Boone and Crockett Club. 2002-2008, National Commission on Science for Sustainable Forestry (Chair, 2003-2005). Member, Board of Directors, World Forestry Center, 2002-2012; Board of Directors, Oregon Forest Resources Institute, 2005-2012; the National Leadership Council of the National Forest Foundation, 2005-2012; Board of Directors, Institute of Forest Biotechnology, 2004-2012; Board of Directors, Pacific Forest Trust, 2005-2012; Board on Agriculture and Natural Resources of the National Academies, 2006-2012. Ph.D. in Wildland Resource Science from the University of California; B.A. in biology, *summa cum laude*, emphasizing fresh water and marine biology, from California State University, Fresno.

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IFMAT-III

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Intertribal Timber Council liaison

Don Motanic. (Umatilla) Technical Specialist, Intertribal Timber Council. Provided support for coordinating IFMAT site visits, arranging for interviews, and identifying contacts for securing information. Former Forest Manager for the Spokane Reservation and BIA Billings Area Forester. Treasurer and Board Member, Wisdom of the Elders, Inc.; American Indian Science and Engineering Society; Washington Agriculture & Forestry Education Foundation; Big Brothers Big Sisters. B.S. Forest Engineering, University of Washington.

Acknowledgments

IFMAT gratefully acknowledges the tribal governments who allowed us to visit their lands. We would especially like to acknowledge the tribal leaders, elders, educators, and other tribal people who interpreted their forest and shared their concerns. We would also like to express our appreciation to the tribal and BIA employees who made time in their workdays to discuss and explain their experiences at the many reservations we visited:

Colville
Coquille
Eastern Cherokee
Flathead
Fort Apache
Lac du Flambeau
Leech Lake
Makah
Menominee
Mescalero Apache
Nez Perce
Penobscot
Quinault
San Carlos Apache
Spokane
Tulalip
Tule River
Warm Springs
White Earth
Yakama

We also extend our thanks to the BIA employees at the four BIA Forestry Regional Offices we visited (Northwest, Pacific, West, Midwest), the BIA Forestry Regional Office contacted by conference call (Southwest), the National Interagency Fire Center, and the BIA Central Forestry Office in Washington, D.C. Special thanks to Dave Wilson at the BIA Branch of Forest Resources Planning, and to Bill Downes, Chief Forester for the BIA (retired).

We also thank the ITC Oversight Committee and the tribes they represent: Steve Andringa (Yakama), John DeGroot (Nez Perce), Bill Downes, (BIA), Jim Erickson (Intertribal Timber Council), Darin Jarnaghan, Sr. (Hoopa), Tim Miller (Grand Portage), and Gary Morishima (Quinault).

We acknowledge our capable reviewers and thank them for their contributions: Joyce Berry, Dean of the Warner College of Natural Resources, Colorado State University; Eric Eberhard, Distinguished Indian Law Practitioner, Seattle University School of Law; and Brenda McComb, Dean of the Graduate School, Oregon State University.

Thanks to Laura Alvidrez, the Program Manager for the Intertribal Timber Council.

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Abbreviations

BBF	Billion board-feet
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BOFRP	Branch of Forest Resources Planning
CFI	Continuous forest inventory
CFR	Code of Federal Regulations
DOI	Department of the Interior
EQIP	Environmental Quality Incentive Program
FHWA	Federal Highway Administration
FMD	Forest management deduction
FMP	Forest management plan
FTE	Full-time equivalent
FY	Fiscal year
GIS	Geographic Information System
IFMAT	Indian Forest Management Assessment Team
IRMP	Integrated resource management plan
ITC	Intertribal Timber Council
MBF	Thousand board-feet
MMBF	Million board-feet
NEPA	National Environmental Policy Act
NIFC	National Interagency Fire Center
NIFRMA	National Indian Forest Resource Management Act
NRCS	Natural Resource Conservation Service
NTFP	Non-timber forest product
OST	Office of the Special Trustee
TFPA	Tribal Forest Protection Act

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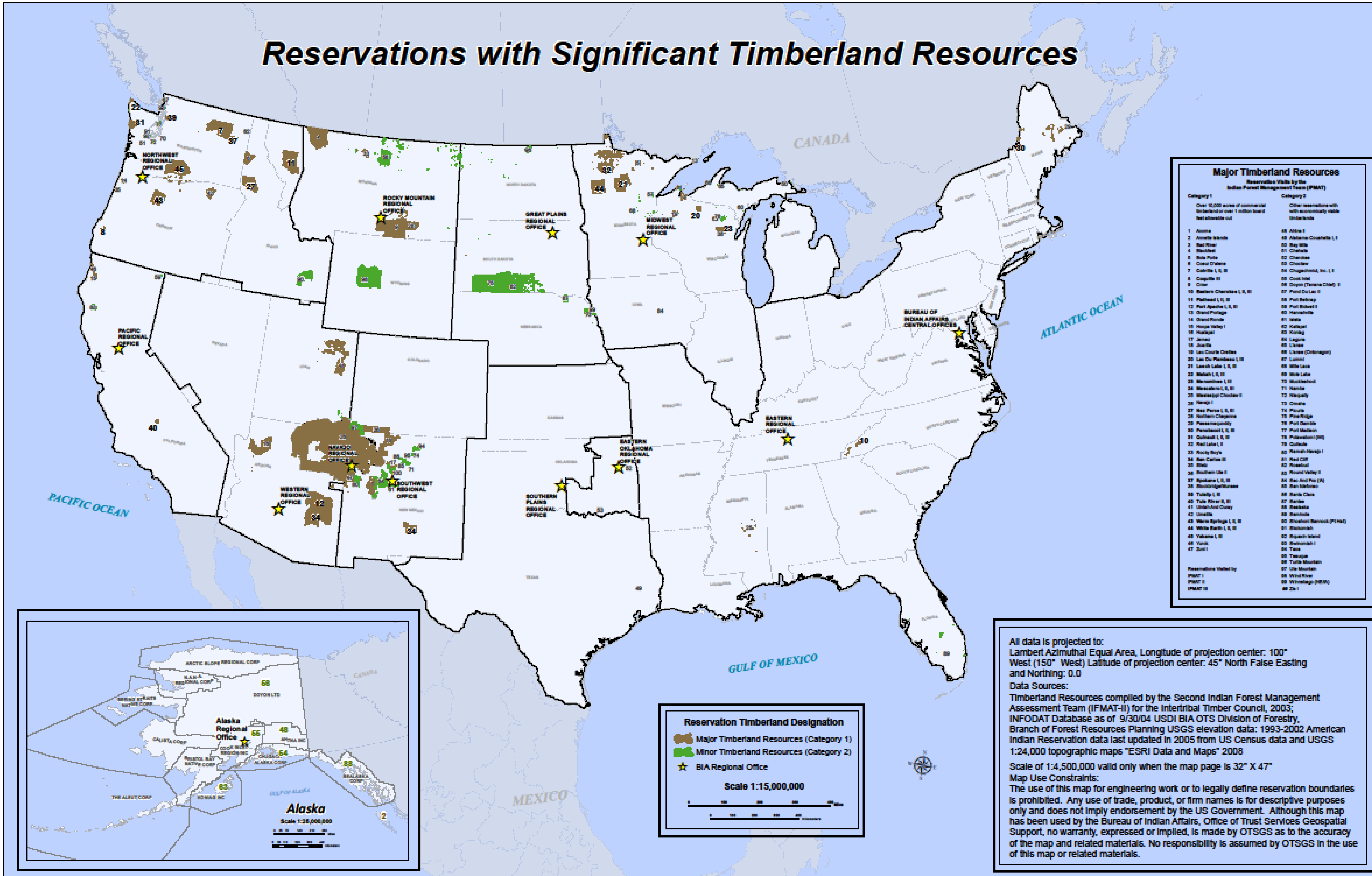
Reservations with Significant Timberland Resources
CANADA
ATLANTIC OCEAN
PACIFIC OCEAN
GULF OF MEXICO
MEXICO
NORTHWEST REGIONAL OFFICE
ROCKY MOUNTAIN REGIONAL OFFICE
GREAT PLAINS REGIONAL OFFICE
MIDWEST REGIONAL OFFICE
PACIFIC REGIONAL OFFICE
BUREAU OF INDIAN AFFAIRS CENTRAL OFFICES
EASTERN REGIONAL OFFICE
EASTERN OKLAHOMA REGIONAL OFFICE
SOUTHERN PLAINS REGIONAL OFFICE
NAVAJO REGIONAL OFFICE
SOUTHWEST REGIONAL OFFICE
WESTERN REGIONAL OFFICE
Major Timberland Resources
Alaska
Alaska Regional Office
Reservation Timberland Designation
Major Timberland Resources (Category 1)
Minor Timberland Resources (Category 2)
BIA Regional Office
Scale 1:15,000,000
All data is projected to:
Lambert Azimuthal Equal Area, Longitude of projection center: 100° West (150° West) Latitude of projection center: 45° North False Easting and Northing: 0.0
Data Sources:
Timberland Resources compiled by the Second Indian Forest Management Assessment Team (IFMAT-II) for the Intertribal Timber Council, 2003;
INFODAT Database as of 9/30/04 USDI BIA OTS Division of Forestry,
Branch of Forest Resources Planning USGS elevation data: 1993-2002 American Indian Reservation data last updated in 2005 from US Census data and USGS 1:24,000 topographic maps "ESRI Data and Maps" 2008
Scale of 1:4,500,000 valid only when the map page is 32" X 47"
Map Use Constraints:
The use of this map for engineering work or to legally define reservation boundaries is prohibited. Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the US Government. Although this map has been used by the Bureau of Indian Affairs, Office of Trust Services Geospatial Support, no warranty, expressed or implied, is made by OTSGS as to the accuracy of the map and related materials. No responsibility is assumed by OTSGS in the use of this map or related materials.

The Third Indian Forest Management Assessment Team Report (IFMAT-III)

Introduction to Indian forests and IFMAT–III

Tribal forests sustain environmental, cultural, and economic benefits for Indian peoples while also generating jobs and revenues for non-Indian communities, and providing important ecosystem values such as clean water and air, species habitats, and carbon storage that benefit the broader society. The National Indian Forest Resources Management Act (NIFRMA), enacted as Title III of Public Law 101-630 on November 28, 1990, provided guidance on a range of challenges and objectives for federal trust administration to support sustainable management of Indian forests.

Among key findings were Congressional acknowledgements that:

- Forest lands of Indians are among their most valuable resources.
- The United States has a trust responsibility toward Indian forest lands.
- Existing federal laws do not sufficiently assure the adequate and necessary trust management of Indian forest lands.
- The federal investment in, and the management of, Indian forest land is significantly below the level of investment in, and management of, Forest Service land, Bureau of Land Management (BLM) forest land, or private forest land.
- Tribal governments make substantial contributions to the overall management of Indian forest land.
- There is a serious threat to Indian forest lands arising from trespass and unauthorized harvesting of Indian forest land resources.

IFMAT reports represent a unique charge, as the only comprehensive, independent, periodic assessments of any Indian trust resource.

Nez Perce. Pine forest. Photo by Larry Mason.

NIFRMA (section 3111) directed the Secretary of the Department of the Interior, in consultation with the affected Indian tribes, to obtain periodic independent assessments of the status of Indian forest resources and their management. The first two assessments were completed in 1993 and 2003. As the third assessment, this report provides an opportunity to look back across the past two decades of change and advancements, as well as challenges that remain for Indian forestry programs.

NIFRMA states that assessments of Indian forests and forest management shall be national in scope and centered on eight topics of inquiry:

A. An in-depth analysis of management practices on, and the level of funding for, specific Indian forest land compared with federal and private forest lands.
B. A survey of the condition of Indian forest lands, including health and productivity levels.
C. An evaluation of the staffing patterns of forestry organizations of the Bureau of Indian Affairs and of Indian tribes.
D. An evaluation of procedures employed in timber sales administration, including preparation, field supervision, and accountability for proceeds.
E. An analysis of the potential for reducing or eliminating relevant administration procedures, rules, and policies of the Bureau of Indian Affairs consistent with federal trust responsibility.
F. A comprehensive review of the adequacy of Indian forest land management plans, including their compatibility with applicable tribal integrated resource management plans and their ability to meet tribal needs and priorities.
G. An evaluation of the feasibility and desirability of establishing minimum standards against which the adequacy of forestry programs of the Bureau of Indian Affairs in fulfilling its trust responsibility to Indian tribes can be measured.
H. A recommendation of any reforms and increased funding levels necessary to bring Indian forestland management programs to a state-of-the-art condition.

As with preceding reports, the Secretary of the Interior contracted with the Intertribal Timber Council (ITC), a national organization of forest-managing Indian tribes, to oversee the development of this report. At the request of ITC, the assessment was expanded to include the following three questions regarding contemporary issues of special interest to forest-managing Indian tribes:

(1) Issues relating to workforce education, recruitment, and retention with special attention to recruiting more Indian professionals in natural resource management.
(2) Quantification of economic, social, and ecological benefits provided by Indian forests to tribal and regional communities.
(3) Consideration of changes in forest management, harvesting, and transportation infrastructure in the vicinity of reservations and the potential for Indian forests to become "anchors" of forest infrastructure.

Other topics that affect Indian forests include trust responsibility, federal budget reductions, policies related to fractionated ownership, and the Tribal Forest Protection Act. Immediate threats to the sustainability of forests across all ownerships, such as wildfire hazard, climate change, endangered species, and market declines, also warrant consideration.

Methodology

ITC selected ten independent, nationally-recognized forestry experts from various disciplines to make up the third Indian Forest Management Assessment Team (IFMAT-III). Some members participated in one or both of the previous IFMAT assessments, allowing them to make direct comparisons over time in their field of expertise. In addition, ITC appointed an oversight committee to work directly with the team. Twenty forested reservations, some large and some small, distributed throughout the United States, generously agreed to host site visits by IFMAT-III during 2012. At each site, tribal and BIA staff provided briefings on resource programs. IFMAT-III also participated in discussions with tribal elders, members, government officials, students, and educators. At each reservation, at least one day was spent touring the tribal forestlands to observe management in practice. On reservations where the tribe operated a wood-processing facility, we visited the sawmill and interviewed staff. Most reservation visits were completed in two days, while a few larger reservations with schools or sawmills required three days. A trip log is included in Volume II.

In addition to reservation visits, IFMAT-III met with educators from schools with Native enrollments in resource sciences and with federal agency personnel at regional and national Bureau of Indian Affairs (BIA) and other federal offices with responsibility for providing services to Indian tribes.

To bring added depth to Indian forest management assessments, IFMAT-III initiated a Native student internship program. Three ambitious scholars from three tribes joined the team as interns for site visits, meetings, and research investigations. Another five

Lac du Flambeau. Oak regeneration. Photo by Vincent Corrao.

IFMAT-III visits, information sources, and participants

Student participation

Principal student interns: Laurel James (Yakama), Ph.D. candidate, University of Washington (UW)
Serra Hoagland (Laguna Pueblo), Ph.D. candidate, Northern Arizona University
Breanna Gervais (Penobscot), undergraduate, Portland State University
Single visit participants: Spus Wilder (Colville), masters of science student, UW
Jeromie Grits (Eastern Band of Cherokee), masters of science student, UW
Everett Isaac (Yakama), Ph.D., UW
Chris Beatty (Fort Apache), masters of science student, UW
Louis Moses (Spokane), undergraduate, Salish Kootenai College

Field visits to reservations

IFMAT-III visited 20 Indian reservations (Colville, Coquille, Eastern Band of Cherokee, Flathead, Fort Apache, Lac du Flambeau, Leech Lake, Makah, Menominee, Mescalero Apache, Nez Perce, Penobscot, Quinault, San Carlos Apache, Spokane, Tulalip, Tule River, Warm Springs, White Earth, Yakama).

Field visits to schools

Four Indian colleges (Salish Kootenai College, Northwest Indian College, Leech Lake Tribal College, and College of Menominee Nation), three community colleges with forestry programs close to reservations (Grays Harbor College, Heritage College, Spokane Community College), one tribal high school with forest education program (Taholah).

Field visits to BIA and federal offices

We visited four BIA Forestry Regional Offices (NW, Portland; Pacific, Sacramento; West, Phoenix; Midwest, Minneapolis), the National Interagency Fire Center (Boise), and the BIA Central Forestry Office in Washington, D.C. We reached one BIA Regional Office (SW, Albuquerque) and the Branch of Forest Resource Planning (Lakewood, CO) by conference call. Meetings in Washington, D.C. included BLM, USDA Natural Resources Conservation Service, USDA National Institute of Food and Agriculture, the USDA Office of Tribal Relationships, and USDA Forest Service Research.

Indian symposia

IFMAT-III attended the 2012 BIA National Forest and Fire Conference and the 2012 ITC National Indian Timber Symposium.

Focus groups

Tribal members, elders, and councils – 12 reservations (Colville, Coquille, Eastern Band of Cherokee, Flathead, Fort Apache, Lac du Flambeau, Menominee, Mescalero Apache, Nez Perce, Quinault, Tule River, Yakama).

Questionnaires

Focus group survey – 218 responses
Workforce survey – 135 responses

Educators, resource professionals, and students

10 reservations (Colville, Eastern Band of Cherokee, Flathead, Fort Apache, Leech Lake, Menominee, Mescalero Apache, Quinault, San Carlos Apache, Yakama).

Data

Data and analysis that help answer the NIFRMA-mandated questions have remained consistent through three IFMAT reports, and are largely provided by the BIA Branch of Forest Resources Planning, supplemented by contributions from other federal and state agencies. Other sources include BIA central offices, BIA Branch of Wildland Fire, tribal forest plans, the USDA Forest Service Forest Inventory Analysis program, and LANDFIRE. Our discussion of tribal leadership and vision was guided by conversations and survey responses contributed by tribal members, young and old. We augmented our collective career experience with review of historic, technical, and legal literature, to derive our findings and recommendations regarding the elusive concepts of state-of-the-art forestry and federal trust responsibility.

students joined IFMAT for reservation visits. These internships provided beneficial opportunities for students to gain experiences, tribal contacts, and leadership skills. We recommend future investigations provide similar opportunities.

Scope and organization of IFMAT-III

We developed key findings and recommendations for each of the NIFRMA-mandated questions, organized as eight separate "task reports." The ITC education question is included in Task Report C, the benefits question is addressed in the section titled "Indian Forest Resource and the Benefits it Provides," and the third ITC question is addressed in the "Anchor Forest" section.

Penobscot. Photo by Larry Mason.

Task A (funding analysis) covers all BIA finding obligations for forestry and fire programs, including Alaska. Other task reports are limited to Indian forest lands held in trust within the contiguous United States. Due to time and budget limitations, we were unable to examine the vast and resource-rich lands of Alaska, where Native individuals, villages, tribes, and corporations hold nearly 50 million acres, half of which are forested. Most of these lands are in fee status, but 460,000 acres are trust lands. Many are widely scattered with no management plans. Assessment of these forests, although needed and long overdue, is beyond the scope of this report.

Volume I of this report presents key findings and recommendations, and summarized commentaries. More detailed findings and recommendations are included in Volume II, along with references and appendix records that support study of Indian forests and forestry programs. All IFMAT-III reports are available at:

http://www.itcnet.org/issues_projects/issues_2/forest_management/assessment.html

Bringing it all together: key messages about Indian forests

To provide an integrated understanding of our findings, we introduce the concept of FIT (fire, investment, and transformation). The themes of fire, investment, and transformation embody the progress that Indian forestry has made over the period of the IFMAT assessments, as well as the opportunities and challenges the future holds.

*Wildland **fire** and related forest health issues jeopardize the economic and ecological sustainability of Indian forests. Strategic **investment** is needed to achieve tribal forest visions and plans, and to meet forest-related U.S. government trust responsibility. **Transformation** of tribes to self-governance, and toward the emergence of Indian forestry as a model for landscape stewardship, presents a pathway leading to a sustainable future.*

FIRE

Few tribal land managers, particularly in the West, deny the growing problem with widespread fuel accumulation owing to decades of fire exclusion. Despite rising costs of suppression across the nation, and the National Fire Plan (2000) leading to major increases in federal agency funding for preparedness and fuel treatments, there has been an increase in the acreage of forests and woodlands consumed by wildfire each year.

Crown fire. Photo from Robyn Broyles.

Tribes have more management flexibility to deal with these issues than their federal neighbors. In general, our findings highlight many examples of healthy and productive Indian forests. We saw sound practices such as innovative uneven-aged forest management including prescribed fire, thinning regimes, and increasing use of integrated multiple resource management.

These examples of effective treatments offer hope, but are not enough to match the magnitude of the growing problem. The health of tribal forests is threatened by density-related issues such as wildland fire, insects, and disease, which will increasingly compromise long-term forest sustainability. This is especially the case in the dry West where much of Indian forest acreage is.

Suppression funding is legislatively based on a 10-year running average and continues to climb, which pulls money from preparedness and fuel management. The boost from National Fire Plan funding is dissipating more each year. BIA-National Interagency Fire Center (NIFC) struggles to maintain a qualified workforce and funding for routine operations, leaving little buffer in the system.

Thinning backlogs (for stand improvements such as precommercial thinning) on tribal forest lands are estimated by the BIA to total 440,000 acres. This does not include the tens of thousands of acres on which hazardous fuel reduction treatments are needed. If land managers are going to use fire as a tool to restore ecosystems and reduce landscape-level fuel accumulations, they need to be treating five to ten times the amount of acres they have been treating annually over the last decade.

Adding urgency to these risks are climate change; personnel shortages; the widespread loss of harvesting, transportation, and processing infrastructure; and adjacent forest ownerships that are densely stocked in many locations, posing increased wildfire threats to tribal resources.

Tribes, with their long and acknowledged relationship with fire and sustainable land management, can lead the way over the coming decades as public land management agencies work toward the goal of restoring the natural role of wildland fire.

Flathead. Controlled burn. Confederated Salish Kootenai Tribes Division of Fire.

INVESTMENT

As previous IFMAT reports found, investment in Indian forestry is substantially lower than for other land ownerships. Indian forests require a minimum annual appropriation of $254 million to bring per acre funding up to par with comparable forest management agencies. In other words, current annual funding for Indian forestry of $154 million is $100 million below comparable public and private programs.

In addition, current funding does not include support for substantial tribal involvement in the Department of the Interior's (DOI) Landscape Conservation Cooperatives or other collaborative initiatives. Tribes need equitable access to funds and services related to climate change planning, adaptation, and response.

Further, staffing is inadequate to provide the quality and quantity of services needed to care for Indian forests. Compensation received by tribal staff is significantly lower than wages available at BIA and other agencies, and retention rates in tribal forestry programs suffer as a consequence. Due to lack of stable, adequate funding, forest management programs are relying more on non-recurring grants, which increases administrative burdens and limits program continuity. The involvement of Native American professionals in forest management has increased, but enrollment and recruitment efforts are inadequate to replace losses. Overall, retirements, insufficient recruitment and retention, and limited professional training opportunities are resulting in the erosion of workforce skills, leadership, and institutional knowledge in BIA and tribal forestry programs.

The 2011 Funding and Position Analysis indicates that at minimum, an additional 792 professional and technical staff are needed to support Indian forestry, an increase of 65 percent above the current level. In addition, IFMAT recommends that a BIA national coordinator be recruited to implement forestry education and training programs as envisioned by NIFRMA. This will cost an additional $12.7 million above the $100 million needed annually for forest and wildfire management.

Our recommendations attempt to identify "leverage points," where targeted changes

might yield substantial benefits. Tribes have enduring connections to their lands, and live with the consequences of their management decisions. Healthy tribal forests also provide spillover benefits to society at large in the form of clean air and water, wildlife habitat, reduced fire risk, and biodiversity. When investments in tribal forests are made and recoverable products can be sold, caring for the forest can bring a net return instead of sunk costs. The future environmental benefits of healthy forests can be regarded as interest earnings. Investments in tree planting and other long-term forest improvement activities assure the added benefits of sustainable communities and the skilled human resources needed to take care of the forest. These factors, together with their greater flexibility in management options, make Indian forestry programs an investment responsibility with high potential returns.

What is needed to bring Indian forestry up to par with other forest ownerships?

- Approximately **800 staff positions**
- Approximately **$100 million annually** in additional funding for forestry and wildfire management
- Another **$12.7 million annually** for forestry education and training programs

TRANSFORMATION

Successes in Indian Country have not gone unnoticed. A transformation is underway in Indian forest management as BIA-dominated policies and programs are being replaced by tribal visions and development of expertise under self-determination contracting and self-governance compacts. Increasing tribal involvement is leading to greater satisfaction with the quality of forest management in tribal communities.

In the twenty years since IFMAT-I, the number of tribes taking control of their own forest management programs through compacts or contracts with BIA has risen more than 84 percent from 59 in 1991 to 112 in 2011. Tribal forest management strategies are focusing less heavily on timber commodity production and more on multi-resource stewardship built upon an integration of western science with traditional knowledge and values.

IFMAT-III found that forest management plans now exist for most tribal forest lands. We suggest that planning could serve tribes in new ways: as a vehicle for funding and staffing negotiations, to develop conservation strategies that provide relief from regulatory burdens such as the National Environmental Policy Act, or as a mechanism for refining the evolving relationship between tribes and the federal government.

Tule River. Sequoia forest. Photo by Larry Mason.

In policy and action, there appears a growing acceptance

of an Indian world view that "all things are connected," accompanied by new understanding that environmental challenges cannot be contained within political boundaries. Increasingly, the potential for tribes to play a prominent role in multi-owner collaborative processes is gaining visibility.

The Tribal Forest Protection Act of 2004 (TFPA) is a notable example. TFPA was intended to protect tribal assets by allowing tribes to contract with federal agencies to carry out hazardous fuel and forest health treatments on adjacent federal lands. TFPA represents an underutilized opportunity to work with state and federal agencies to increase jobs and economic stability in tribal communities, protect tribal resources and treaty rights on and off the reservation, and implement needed fuel hazard reductions that otherwise might not be accomplished. TFPA partnerships should be aggressively expanded, as 80 million acres of national forest land are in need of treatment.

Coquille. Precommercial thin. Photo by Vincent Corrao.

Another opportunity for tribal forestry to play a pivotal role in efforts to achieve cross-boundary, landscape-level resource management is through anchor forests. An initiative of the Intertribal Timber Council, the anchor forest concept centers on the idea of tribal forest managers collaborating with neighboring ownerships to collectively ensure the long-term flow of harvested timber sufficient to sustain wood processing facilities within feasible transportation ranges. Key to these collaborations is recognizing that forest management must be both ecologically sustainable and economically viable.

Trust responsibility

We find that the federal government continues to inadequately fulfill its trust obligations to Indian forestry as identified by Congress in the preamble to NIFRMA (Title III Sec 302). Real funding and staffing levels are lower now than at the time of IFMAT-I and continue to be well below those of comparable public and private programs. In addition, response continues to be inadequate to the NIFRMA mandate that the federal government work with tribes to provide for multiple-use management consistent with tribal needs, such as subsistence and ceremonial uses, fisheries, wildlife, recreation, and aesthetic values.

We recognize that no explicit, uniform performance standards for Indian forest management have been established to provide a basis for evaluating the degree to which the federal government is fulfilling its trust responsibility. However, we remain concerned that 1) funding and staffing remain insufficient to support state-of-the-art forest management, 2) separation of oversight from operational responsibilities has not be achieved, and 3) administrative processes for Indian forestry are becoming extremely costly to complete.

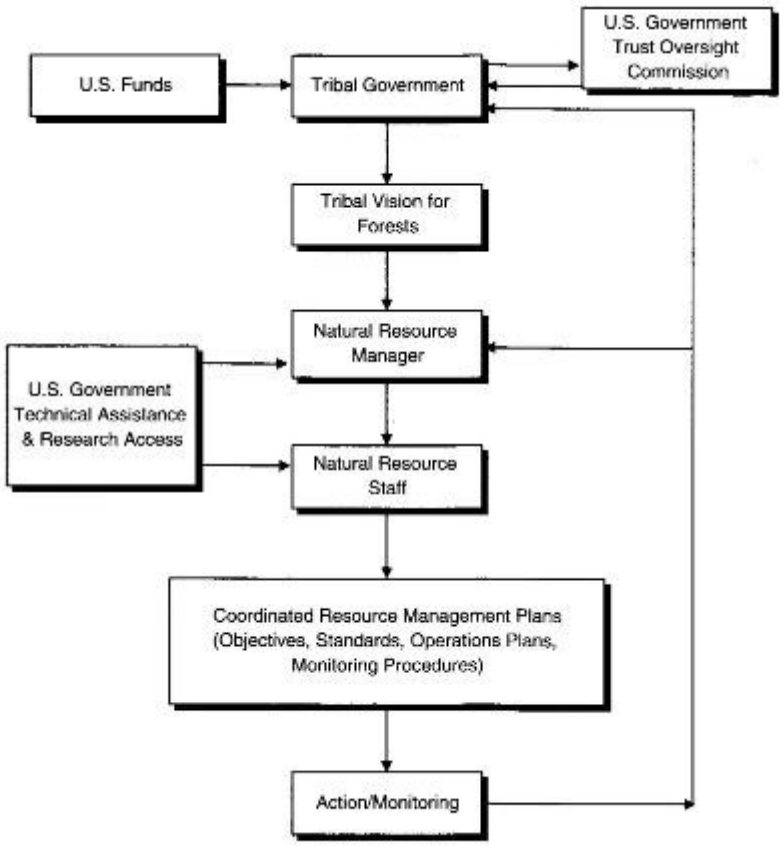

Figure 1. *An organization framework for third-party oversight as recommended by IFMAT.*

After 20 years, still both pitcher and umpire

As noted in IFMAT-I and II, a conflict of interest is created by the dual obligations of the Bureau of Indian Affairs to both deliver Indian services *and* to assess whether those services are adequate and well-executed. Prior IFMAT reports characterized this situation as the BIA attempting to perform as both pitcher and umpire.

The diagram above was proposed by IFMAT-I as a framework to restructure trust oversight (fig. 1). An independent commission would periodically review performance of services against tribal plans, accepted by the Secretary of the Interior, and would have the power to require corrections. The commission would be national-level, but with local reach. An example of such a model is the Nuclear Regulatory Commission. The trust oversight commission could contract with regional entities to be primary providers of oversight duties, subject to commission review. Any trust oversight body must have the technical capacity and skill to assess forestry management issues.

Fulfillment of the federal trust duty depends on standards against which performance can be evaluated. Standards must have adequate oversight for their execution, and must be enforced. An effective mechanism for enforcing standards does not exist, and the third-party oversight as recommended by past IFMATs has not been implemented. A state-of-the-art Indian forestry program must: 1) be assured of predictable, consistent, and adequate funding for forestry programs on all reservations, whether direct service, contracting, or self-governance compacting; 2) have access to adequate technical and research support; 3) be guided by

each tribe's vision for its forests; and 4) strive to sustain tribal resources and objectives. The condition of the forest itself, over time, is the best measure of state-of-the-art forest management. A central part of trust responsibility is to see that each tribe has the means to develop its vision and management plans with sufficient resources and personnel.

Concerns linger regarding separation of operational responsibilities from oversight — the "pitcher-umpire" issue. The Indian trust beneficiaries and the credibility of government will be better served by addressing this conflict of interest. It remains to be seen if current efforts, such as the Secretarial Commission on Trust Administration and Reform, and BIA streamlining, will effectively address conflicts of interest and improve administration of trust.

Twenty-three years after the first IFMAT assessment, notwithstanding the record of tribes in improving management of their forests, these forests remain underfunded. In addition, conflicting rules and regulations still hinder rather than help tribes achieve self-governance, and tribal forests are increasingly threatened by inaction on the borders of their lands.

San Carlos. Mature juniper. Photo by Vincent Corrao.

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Treaties, Acts of Congress (including NIFRMA), and decisions of the federal courts acknowledge the United States' trust responsibility to Indian tribes. The trust responsibility applies to the entire federal government. While it is the case that Congress has delegated primary responsibility to the President and Secretary of the Interior in 25 U.S.C. §§ 2 and 9, it is also clear that every department and agency in the Executive Branch is charged with acting in a manner consistent with the trust responsibility. The trust responsibility imposes fiduciary duties on the federal government and in the absence of any Act of Congress to the contrary, the federal courts will hold the government to a strict standard of compliance with those duties.

When viewed in its entirety, the legislative history and the plain language of NIFRMA clearly evince a Congressional intent to embrace the trust responsibility and to apply it strictly. In doing so, Congress also intended to require the

Executive Branch to provide support for both sustained yield and multiple-use management of Indian forest lands, consistent with the goals and vision of each tribe and the laws governing self-determination and self-governance. During the consideration of NIFRMA, Congress noted with approval that the tribes were using the Indian Self-Determination Act to enter into contracts, grants, cooperative agreements, and self-governance compacts in the area of forest management because "it has yielded improved forest management activities."

The Supreme Court long ago concluded that the trust responsibility for Indian forest management is clear. In *United States* v. *Mitchell*, the Court determined that:

> *Our construction of these statutes and regulations is reinforced by the undisputed existence of a general trust relationship between the United States and the Indian people. This Court has previously emphasized "the distinctive obligation of trust incumbent upon the Government in its dealings with these dependent and sometimes exploited people."*
>
> *Because the statutes and regulations in this case clearly establish fiduciary obligations of the Government in the management and operation of Indian lands and resources, they can fairly be interpreted as mandating compensation by the Federal Government for damages sustained. Given the existence of a trust relationship, it naturally follows that the Government should be liable in damages for the breach of its fiduciary duties. It is well established that a trustee is accountable in damages for breaches of trust.*

Both the House and the Senate were cognizant of the Court's holding in *Mitchell II* during the consideration of S. 1289, the bill that became NIFRMA, and both embraced this same language from the Court's opinion in *Mitchell II*. There can be no doubt that the Congress intended to accept the Court's holding in *Mitchell II* and to incorporate the Supreme Court's understanding of the trust responsibility into NIFRMA.

The legislative history for NIFRMA demonstrates that Congress intended to address many of the same issues that have been identified as problems in IFMAT-I, II, and III. The historical and consistent lack of adequate funding for the management of tribal forests throughout the 20th century was well documented, as was the continuous breach of what was characterized as a "sacred trust." The lack of adequate funding has persisted despite the enactment of NIFRMA.

NIFRMA was also intended to address issues such as:

- The need for additional personnel.
- Improved forest management planning and integrated resource management planning.
- Technical assistance in marketing forest products.
- Forest road systems, fire protection, and pest control.
- The direct expenditure of tribal funds to carry out the federal trust responsibility for the management of tribal forests.
- The burdens of compliance with archaeology and historic preservation laws, which were originally intended to apply to public lands, not tribal trust lands.
- The management problems and expenses created by the checker-boarding of Indian forest lands as a result of the General Allotment Act.
- The problems created by the absence of statutory authority for multiple-use management of Indian forest lands and the single-minded focus on sustained yield management, without regard to tribal objectives that are consistent with tribal values and needs such as subsistence and ceremonial uses, fisheries, wildlife, recreation, aesthetic or other traditional values.

Indian people's vision

Management of Indian forests must be directed toward achieving a dynamic set of tribal objectives. Thus, a tribe's vision for its forests is a critical component of effective management planning, implementation, and self-governance. Ideally, this vision is reflected in a written document that can be referenced or incorporated into a forest management or natural resources management plan. A clear articulation of this vision is particularly important given that tribal people tend to live intimately with the consequences of management decisions. Often their forest is neither remote nor conceptual but rather their everyday environment and a constant source of both material and spiritual sustenance.

In an effort to understand the view of tribal citizens and resource professionals regarding Indian forests and forestry, IFMAT-I conducted surveys and focus group discussions during site visits to Category I and II timber tribes.

IFMAT-II and III adopted similar survey and focus group techniques to evaluate if 1) the overall vision first articulated in IFMAT-I has changed, and 2) if progress has been made in transforming forest management to better reflect that vision.

Leech Lake. Pine regeneration. Photo by Larry Mason.

Methods

To facilitate comparison, the same survey instrument was used as in the other assessments. The only difference from previous IFMATs was that the survey was made available in an online format as well as through paper copies. A copy of the survey can be found in Volume II.

We collected a total of 218 surveys, and conducted focus group discussions during 12 of the site visits. Each focus group included 5-15 individuals invited to attend by the tribal forester. We asked the same questions as in previous IFMATs: 1) "What do you most value/want from your forest and why?" 2) "What do you think about current management practices on your tribal forest?" and 3) "Have you seen changes in management since the last IFMAT, and if so, what has changed?" Focus groups were held at the Colville, Coquille, Eastern Band of Cherokee, Flathead, Fond du Lac, Fort Apache, Menominee, Mescalero Apache, Nez Perce, Quinault, Tule River, and Yakama Reservations.

2012 survey respondents

Tribal public: 127
Tribal natural resources: 28
Tribal forestry: 31
Non-tribal employees: 32

Total: 218

IFMAT-III findings

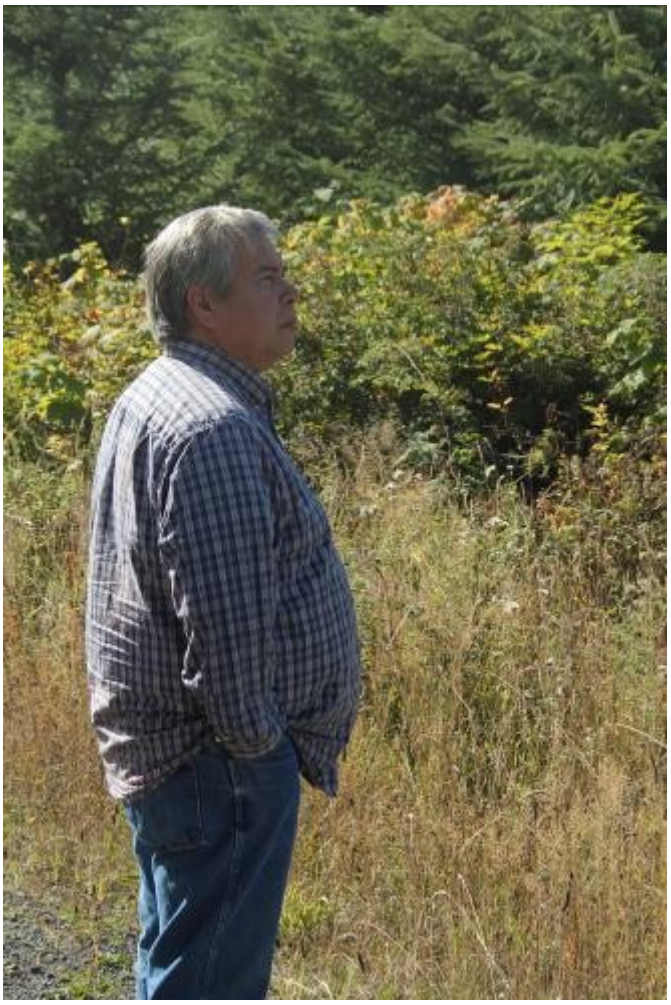
Tribal vision themes remain consistent over the last 20 years.

The diversity of Indian tribes, values, and forests make generalization difficult. However, for the most part tribal members tend to express a holistic view of the forest, seeing it as more than an aggregate of resources. Tribes have consistently articulated the primary importance of caring for the forest and managing it in an integrated fashion.

"As an Elder once said, 'Fish grow on trees.' Everything is part of a circle."

—IFMAT-III focus group participant

Another central element of the tribal vision is the importance of self-determination and self-governance. With recent trends toward greater management by tribes, these values have been at the heart of many changes to tribal forestry operations and have led to increased tribal member satisfaction in the quality of forest management. Two central components of tribal vision were again expressed repeatedly in focus groups, surveys, and discussions: the role of youth education, and effective communication with the tribal public in forest and natural resource management.



Makah. Photo by Mark Rasmussen.

Convergence of goals and values between tribal members and resource managers continues.

IFMAT-I reported a significant divergence between tribal public values and the perception among BIA personnel of those values. Tribal members on the whole favored "protection" of the forest resource, with strong concern also for cultural uses and aesthetics. BIA personnel, especially non-tribal foresters, placed greater emphasis on income generation as a primary management value. Through further interpretation of survey results and focus groups held at most reservations visited, it emerged that tribal members defined protection as the sustainable provision of all benefits derived from the forest, including but not limited to harvesting and revenue-generating activity, and beginning with the assurance that forests are kept as forest land in perpetuity.

IFMAT-II reported a convergence of views and values between the tribal public and resource managers. A majority of survey respondents, including both tribal members and forestry professionals, agreed that forest protection should be the management priority. This shift in perception was especially evident among non-tribal BIA foresters, who placed markedly less emphasis on income generation compared to IFMAT-I. IFMAT-II explained this trend toward greater convergence as 1) the beginning of a shift toward greater tribal self-governance, 2) an increase in the number of forest managers who are Native American, and 3) greater presence and influence of

tribal natural resources departments.

IFMAT-III found that the trend toward greater agreement on management priorities continues. All groups valued protection as the most important objective (fig. 2), with cultural and scenic values remaining fairly consistent. Income production remains the only category showing inconsistency between the groups, but the gap is narrowing. Although 31 percent of tribal natural resource employees rated income as important, none of this respondent group rate it the most important value, whereas more than 20 percent of non-Native tribal employees cited income as the paramount benefit. That difference, however, is minor compared to IFMAT-I. IFMAT-III finds general agreement that protection of forests should be the management priority.

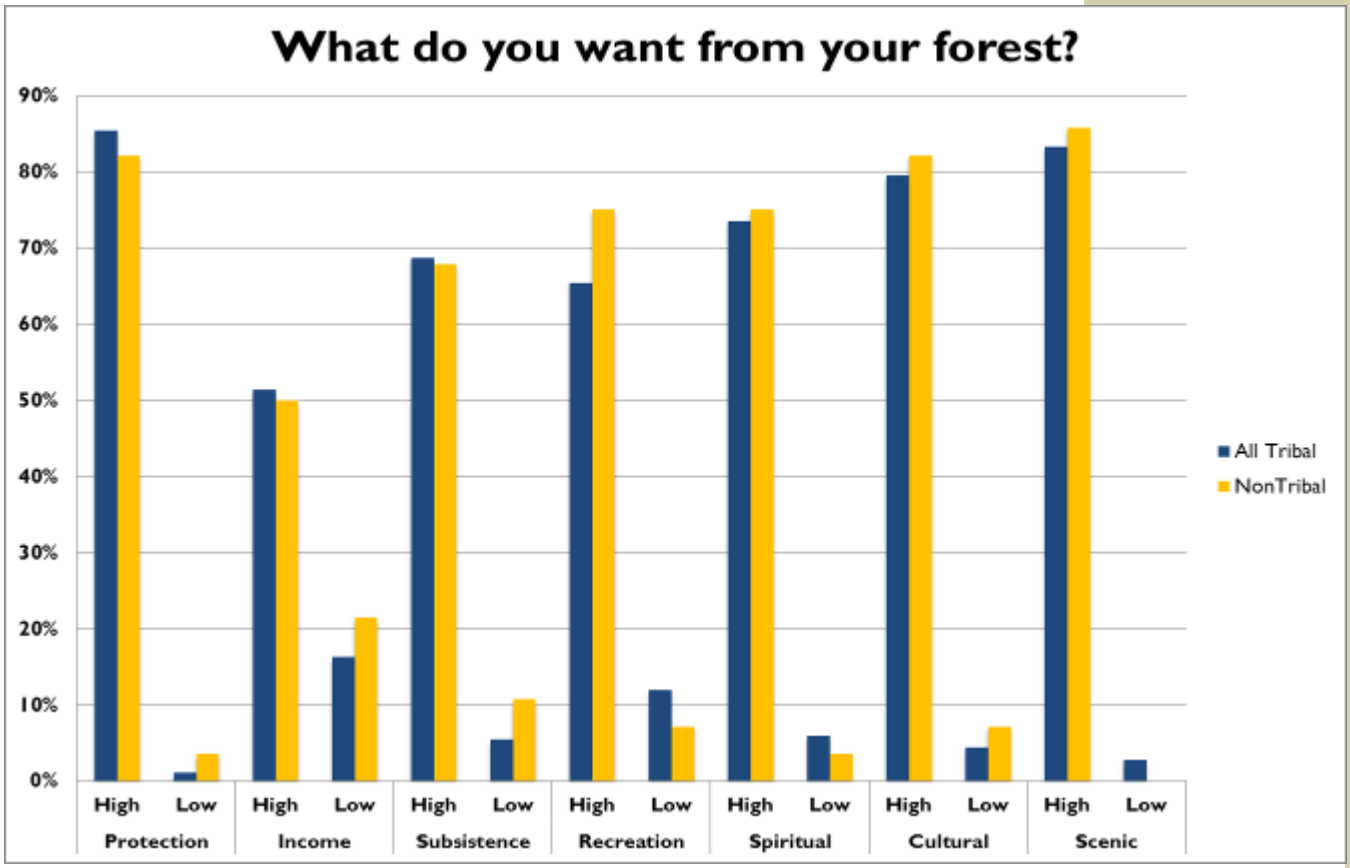


Figure 2. 2012 survey results. Participants rated forest values from 5 (high value) to 1 (low value). The results above show respondents who selected 5 or 4 for high value or 2 or 1 for low value for seven forest values. Respondents were divided as all tribal members (n = 186) and all non-tribal (n = 32).

Perception of the quality of management over time has noticeably improved over time.

Most tribes visited during IFMAT-III now manage forest resources themselves, or in a few cases share management responsibility jointly with the BIA. Greater tribal input in management direction and vision has corresponded with an increase in positive perception of the quality of management by tribal members.

IFMAT-I found that overall, the tribal pubic was not satisfied with the quality of management on tribal lands. Specifically, less than 25 percent of survey respondents gave a "good" or "excellent" rating to the following activities: grazing, recreation, water quality and quantity, non-timber forest products, employment of tribal members, creation of new enterprise, food gathering, spiritual values, visual quality, protection from pollution and waste, poaching, trespass, and overall management.

IFMAT-II found some improvement in overall perception of the quality of management, but still less than 25 percent of survey respondents gave a "good" or "excellent" rating to the following activities: grazing, recreation, non-timber forest products, employment of tribal members, creation of new enterprise, spiritual values, visual quality, poaching, and trespass. Categories that showed improvement included water quality and quantity, food gathering, protection from pollution and waste, and overall management.

In the last 10 years, tribal member satisfaction with aspects of management has improved, with only three activities now receiving less than 25 percent "good" or "excellent" ratings: grazing, creation of new enterprise, and trespass (fig. 3). Although approval is by no means universal, the general trend is positive, and five programs received greater than a 50 percent "good" or "excellent" rating: wildlife management, fisheries management, water quality, cultural site protection, and forest resource protection. Five activities, however, received a higher proportion of negative ratings than positive. These were grazing, creation of new enterprises, trespass, management

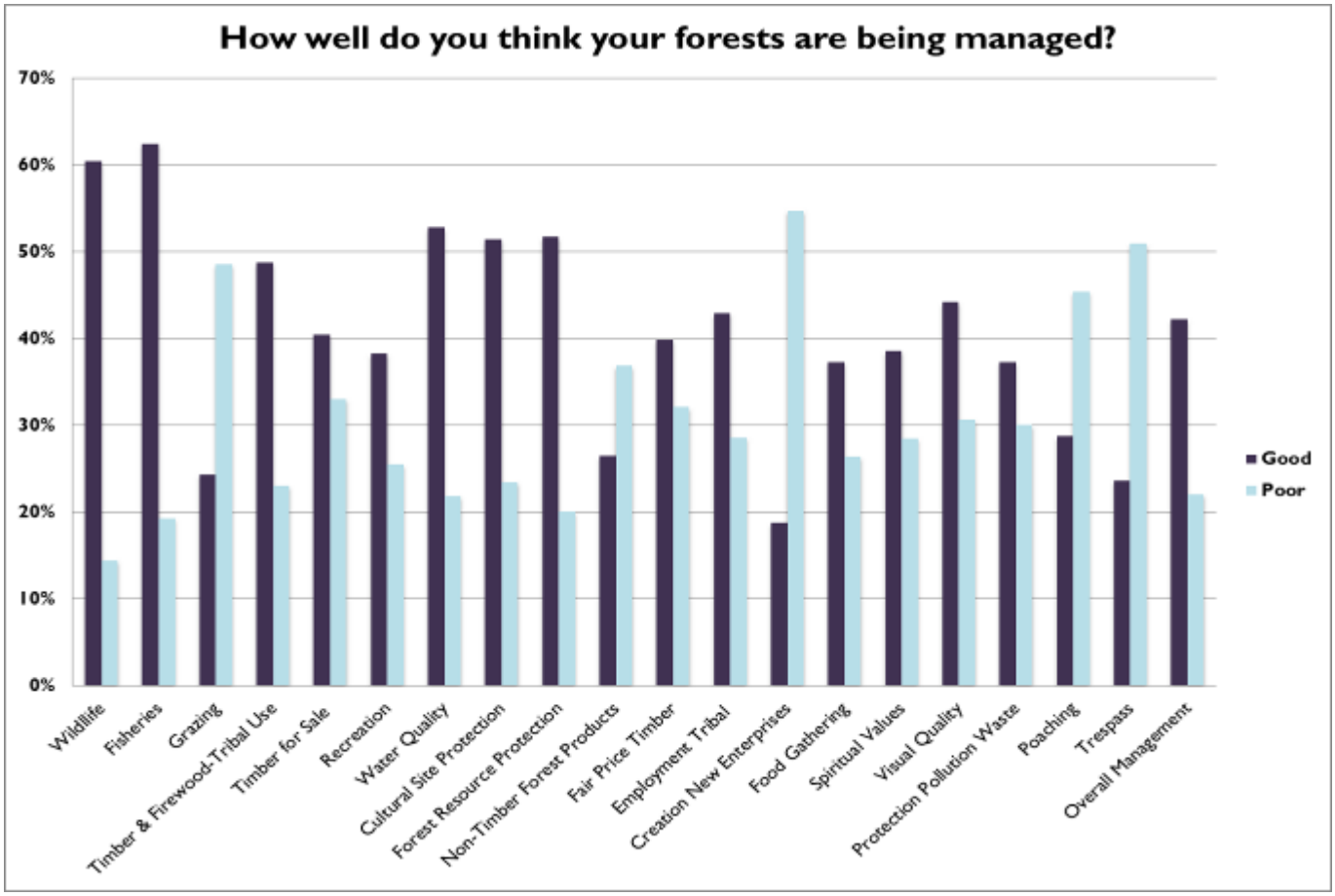


Figure 3. 2012 survey results. Respondents indicate confidence in most management capabilities although many report that grazing, creation of new enterprises, trespass, non-timber forest products, and poaching need greater attention.

for non-timber forest products, and poaching. Overall management received 42 percent positive ratings, compared to only 22 percent of tribal members surveyed that ranked it as poor.

In summary

As in previous IFMATs, we believe that a tribal vision of future forest appearance, productivity, and dynamics is the foundation of management planning. An integrated vision of the suite of components, values, and products a tribe wishes to pursue will require effective provision of information and education by resource managers, and vigorous involvement and discussion by leaders and members. Without this vision process, we feel that integrated management planning will produce modest and sometimes harmful results.

Recommendation

We suggest the BIA provide funding through the Intertribal Timber Council or other organizations for tribes to conduct meaningful public input, scoping, and visioning sessions as well as field tours and other means for creating dialogue that will further strengthen the vision and direction of tribal forestry during the coming decade. Outreach should extend to K-12 students as well as tribal elders, leaders, and general membership.

White Earth. Small-diameter pine removal. Photo by Larry Mason.

The Indian forest resource and the benefits it provides

This section addresses ITC question 2: Quantification of economic, social, and ecological benefits provided by Indian forests to tribal and regional communities.

Not counting Alaska, Indian lands once covering 2.4 billion acres are now reduced to 57 million acres, mostly in the West. A very small fraction of lands in Indian Country are in fee ownership (in which the owner holds title to and control of the property): the vast majority are held in trust for tribes and individual Indians by the federal government. The Secretary of the Interior as the designated federal trustee of Indian Country thus oversees the largest land trust in the world.

"The forest is us. The forest is the most important part of our future. We are planning to be here forever."

—IFMAT-III focus group participant

Flathead photo by Vincent Corrao.

On a total of 334 Indian reservations in 36 states, there are 18.6 million acres of Indian forests and woodlands. Of the total number of reservations, 305 have trust status and 29 are in fee ownership. Excluding Alaska, there are 18 million acres on 294 Indian reservations within the contiguous U.S. held in trust by the federal government. Complicating Indian forestry further are the thousands of fragmented, fractionated, and forested allotted lands owned by individual Indian families, but held in trust by the government, most often within reservation boundaries, and managed in conjunction with tribal forest lands.

Diverse forest types: diverse benefits

Forest land and the resources it provides are very important to tribal people. Since the first IFMAT report in 1991, through dedicated programs of reacquisition, tribes have been able to gradually increase their cumulative forest holdings by more than 2.8 million acres. Tribal forests cover about one-third of all Indian trust lands and serve as the economic and cultural backbone for many Indian reservations. There is perhaps no other single natural resource as varied or as important to tribal governments and their members. Forests store and filter the water and purify the air. They sustain habitats for the fish and wildlife that provide sustenance for the people. They produce foods, medicines, fuel, and materials for shelter, transportation, and artistic expression. Forests provide revenues for many tribal governments, sometimes the principal source of revenue, as well as employment for Indian people and rural communities. Forests provide a sense of

IFMAT-III reporting regions

There are 12 BIA Regional Offices. For comparability to prior IFMAT reports, we have grouped them into five reporting regions:

Northwest – Northwest (Portland), Rocky Mountain (Billings), Pacific (Sacramento)

Southwest – Southwest (Albuquerque), West (Phoenix), Navajo (Gallup)

Lake States – Midwest (Minneapolis), Great Plains (Aberdeen), South Plains (Anadarko), East Oklahoma (Muskogee)

East – Eastern (Nashville)

Alaska – Alaska (Juneau)

place that sustains tribal lifeways, cultures, religions, and spiritual practices. These "ecosystem services" are perhaps nowhere more closely linked to community and cultural vitality than in Indian Country.

Tribal forests and woodlands are ecologically and geographically diverse, hosting representative samples of most of the tree species and forest ecosystems found in North America. They include, for example, Douglas-fir, western red cedar, and hemlock in the moist Northwest; giant sequoias and redwoods in California; ponderosa pine, lodgepole, and larch in the Inland West; pine, pinyon, and juniper in the dry woodlands of the Southwest; aspen, maple, oak, and white pine in the Lake States; eastern red spruce in the Smokey Mountains; and northern hardwoods and mixed conifers in the Northeast.

Of the 18 million forested acres on Indian reservations, six million acres are considered commercial timberlands, nearly four million acres are commercial woodlands, and more than eight million acres are a mixture of non-commercial forests and woodlands. More than one million acres of these forests have been set aside from harvest by tribal governments as cultural and ecosystem reserves.

Timber and other forest products

The estimated total standing inventory of commercial timber in Indian Country is 43 billion board feet (BBF). Most of the income from harvest of forest products comes from these commercial timberlands. The Northwest has 20 percent of all Indian forest land, but more than half of the forest inventory. In 2011, two-thirds of total Indian harvested timber volume and 80 percent of the stumpage value came from harvest activities in Northwest forests. Although the Southwest has nearly 30 percent of Indian timberland and 80 percent of the commercial woodland, in 2011 harvest volumes were only two percent of the total Indian timber harvest and less than one percent of the stumpage value.

The Lake States region, with 20 percent of the commercial timberland, produces most of the hardwood harvest: 25 percent of the total timber volume, and 18 percent of the stumpage revenue. Eastern forests contribute seven percent of the timber volume and three percent of revenue. While timber harvests occur in Alaska, primarily on fee lands owned by Native corporations, analysis of Native forest land in Alaska is beyond the scope of this report.

What about woodlands?

Woodlands encompass the largest area of Indian forest ecosystems. Eighty percent of these lands are found in the Southwest region. In total, 202 tribes have woodlands. For 109 of these tribes, woodlands are their only forests. Water, firewood, and traditional plants are important resources derived from woodlands.

Little commercial timber harvesting occurs on the woodlands and non-commercial forests that account for two-thirds of all Indian forested areas. The economic implications of woodland utilization, albeit generally overlooked, can be significant. Analysis of BIA free-use permits indicates that tribal members gathered 78,000 cords of firewood in 2011. Tribal use of firewood instead of heating oil to warm their homes avoided a cumulative cost burden of more than $30 million.

As noted in previous IFMATs, woodlands receive too little in resources and attention to be managed at a state-of-the-art level. Woodlands are semiarid ecotones at the margin between forests and rangelands; responses of vegetation to climate changes are expected to be most rapid and extreme at these types of boundaries between ecosystems.

We observed some excellent woodland management initiatives, but more resources and research are urgently needed if these lands are to be sustainably managed. Grazing practices (including the effects of feral horses) are having a negative impact on many Indian woodlands, juniper encroachment is altering surface water availability in some areas, and tribal elders are attributing changes in woodland vegetation and wildlife abundance to climate change.

Timber revenues have steadily dropped in the past two decades (fig. 4), causing negative economic consequences on forested reservations (see more in the anchor forest section of this report). For instance, forest management deductions (FMD) are assessed as a percentage deduction from gross timber sales revenue. Since these monies are used for stewardship activities such as tree planting, falling timber prices limit tribal abilities to practice forestry. When FMD shortfalls are made up from other tribal funds, programs such as student scholarships may suffer. Other consequences include decreased income to support tribal governmental functions and loss of business opportunities for tribal members on forested reservations. When federal funding for tribes declines as well, cycles of reservation poverty and forest health decline are perpetuated.

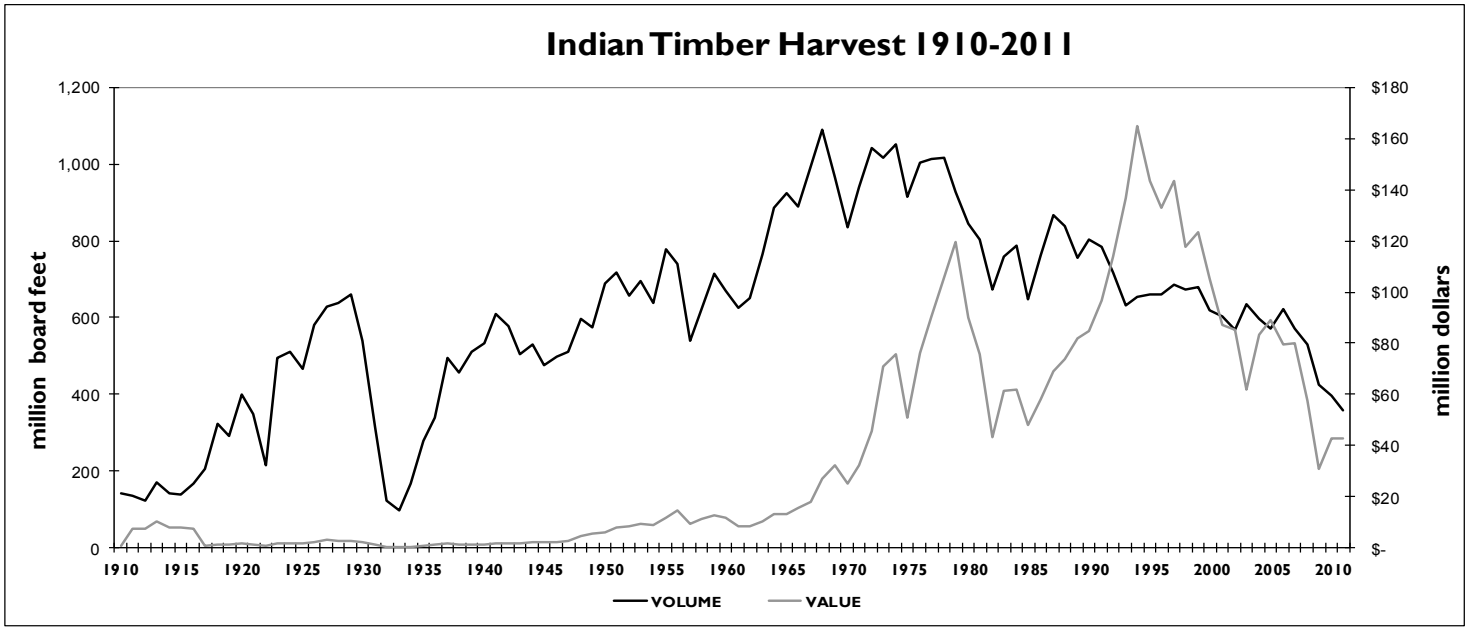


Figure 4.

Although tribal timber activities have slowed considerably over the decades, Indian forests remain a source of significant employment. Timber harvests extend high job and revenue leverage, in part because of the labor-intensive nature of some Indian forestry practices, such as uneven-aged management. BIA reported that jobs resulting from timber harvest in 1991 and 2001 were equivalent to 53 full- and part-time jobs for every MMBF of timber harvested. These economic multipliers indicate that for 2011, Indian timber harvests generated 19,000 full- and part-time jobs. This suggests a loss of more than 10,000 jobs, 38 percent below 2001 levels.

In general, our evaluation of investments in Indian Country was hindered by a lack of accessible, current information. Updated assessments of the regional impacts of Indian forestry, once provided periodically by the BIA, have not been available for 20 years.

Quinault. Photo by Mark Rasmussen.

A recent study commissioned by the ITC (*Branding and Marketing of Tribal Forest Products*) reported on opportunities to increase value returns and employment from Indian forests. The study team found that sensitive harvest of non-timber forest products (NTFP) had promise and aligned well with sustainable forestry. For thousands of years, Native Americans have actively used many of the species that we now call NTFPs. Indians have used more than 4,000 species to create over 40,000 medicines, foods, shelter materials, baskets, and other subsistence and trade items. Contemporary recognition of the value of indigenous approaches to health and wellness has led to incorporation of many traditional plants and herbs into medicines. High regard for Native remedies helps create opportunities for Indian peoples to develop markets for health, herbal, and cosmetic products.

Eastern Band of Cherokee. Native food plants. Photo by Vincent Corrao.

Tulalip. Totem carved from a single cedar tree. Photo by Larry Mason.

Traditional tribal stewardship represents the earliest form of sustainable management of forest ecosystems, adding further NTFP opportunities to take advantage of high-value "buy local" programs, organic food marketing, and direct-to-consumer "green" sales programs. Harvest, preparation, and sale of NTFPs provide low-cost entry to potentially rewarding business opportunities. BIA reporting, although dated, suggests that collection, use, and sale of basketry materials, range forage, berries, floral greens, and a host of other NTFPs generate tribal benefits equivalent to $8-10 million annually. Marketing both traditional and new forest products can provide individuals and businesses based in Indian Country with sustainable incomes from the forest, which could be critical during the cyclical fluctuations of timber markets. In addition, marketing of NTFPs could fit well with other tribal enterprises such as gaming and ecotourism.

Spokane. Thinning treatment. Photo by Mark Rasmussen.

The list of NTFPs is extensive, including medicinals, forest botanicals, fresh florals, preserved florals, charcoal, aromatics, nuts, berries, roots, flowers, decorative woods, cones, seeds, Christmas greenery, chips, shavings, excelsior, sawdust, bark mulch, pine straw, firewood, syrups, wild game meats, honey, craft materials, mushrooms, native landscape plants, music woods, and cultural and spiritual products. Progress, however, has been constrained by limited access to start-up capital

and a lack of available expertise in product marketing.

Fire management: jobs and forest health

In addition to forestry programs, the BIA Branch of Wildland Fire Management oversees more than 60 percent of the DOI casual firefighter workforce, which is on call as needed for deployment to interagency wildland fire emergencies. Many of the approximately 7,000 employees in the workforce are Native Americans. The BIA and tribes jointly manage response resources including helicopters, air tankers, engines, and bulldozers. In aggregate, BIA received more than $160 million for wildland fire management in 2011, which included fire preparedness, hazardous fuels reductions, suppression, and burned area emergency response funds.

These BIA funds serve to protect people, wildlife, property, and forest ecosystems by providing resources for wildland fire management programs, reducing the risk of fires, and protecting resources once fires start. On average, BIA obligates around $75 million per year for fire suppression alone.

Investments in thinning and hazardous fuels reductions keep forests healthy and resilient, helping to avoid stand-replacing crown fires and their accompanying environmental and economic consequences, including pollution to the atmosphere. In 2011, Indian tribes and the BIA performed hazardous fuel reduction treatments on 232,368 acres (fig. 5) throughout the nation at a total cost of $40.3 million, an average of about $174 per acre. Studies of the economic impacts of 2005 national forest fuels reduction programs in the Southwest indicate that 16.7 jobs and $705,000 in economic activity were generated from $1 million allocated to fuels reduction treatments. These numbers suggest that 2011 BIA hazard reduction treatments resulted in close to 700 reservation jobs and $28.4 million in economic outputs.

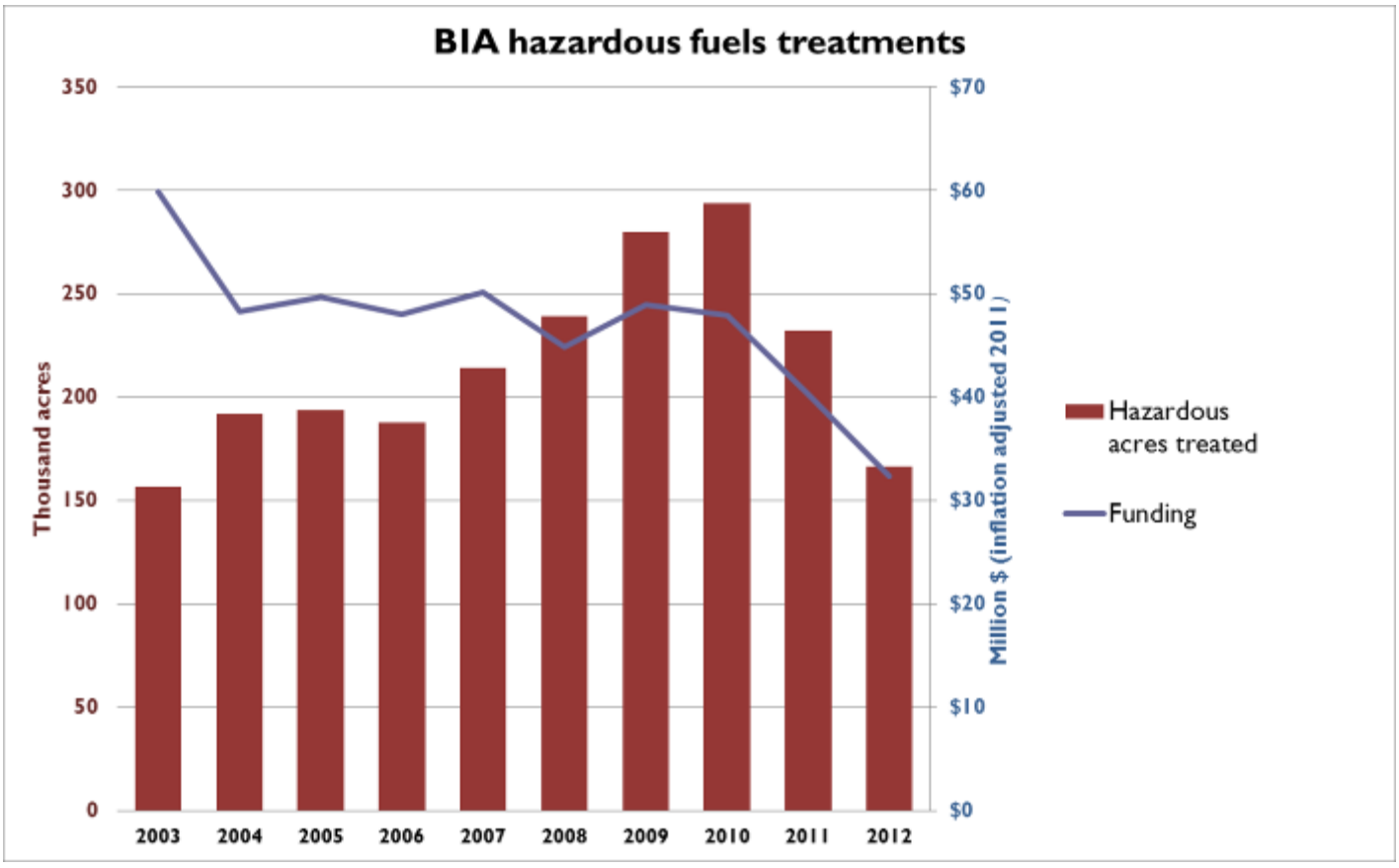


Figure 5. Funding for hazardous fuel treatments has been steadily declining.

Work projects that create employment for seasonal labor are welcome in jobs-starved reservation communities. For example, tree plantations on 15,600 acres of reservation lands in 2011 established new forests and generated around 10,000 person-days of employment. However, there is much more to be done. The Indian Forestry Status Report, submitted annually to Congress as required by NIFRMA, indicates a backlog on Indian reservations of more than 750,000 acres in need of planting, thinning, or other stand improvement.

Not only Indian forests require more aggressive treatment. Upwards of 80 million acres of overstocked forests are in need of treatment on national forest lands. Indian tribes and the Forest Service share nearly 3,000 miles of contiguous borders and sixty tribes have treaty rights that extend onto federal forests and rangelands, which provide culturally important resources. Many of these resources, such as ungulates and huckleberries, need active management to restore and maintain productivity. The agency and tribes are more than just neighbors; they are partners with common goals for social, cultural, ecological, and economic sustainability.

Federal forests at risk from uncharacteristically severe wildfires can pose hazards to tribal communities. For example, wildland fires that started on private and federal lands in southern California in 2003 devastated several Indian reservations. Similarly, fires originating on federal lands burned onto reservation land in the ponderosa pine forests of the Inland West in 2008; and in 2011, burned centuries-old cliff dwellings and destroyed about 6,000 acres and 63 homes on the Santa Clara Pueblo in the Southwest. Because losses from wildland fire can threaten social and economic stability, tribes are seeking a more proactive role in partnership with federal neighbors to confront declines in forest health and reduce hazardous fuel loads under the authority provided by the Tribal Forest Protection Act of 2004.

Indian fire fighters contribute every year to fire suppression efforts across the nation's public and private landscapes under the authority of the Branch of Wildland Fire Management. Since 1948, with the formation of the Mescalero Red Hats and the Southwest Indian Fire Fighters, thousands of American Indians have distinguished themselves as "fire warriors." Approximately one out of five forest and wildland firefighters today is an American Indian or Alaska Native. Firefighting remains a much-needed source of income for reservation families. Firefighting wages represent approximately one-third of the income Indian firefighters earn each year.

San Carlos Apache. Geronimo Hotshots. Photo by Michael Sterner.

High-severity crown fires cause significant environmental damage to forests, wildlife, and water quality. They also release large pulses of greenhouse gases, such as carbon dioxide (CO_2), into the atmosphere. Wildfires in the U.S. release volumes of CO_2 equivalent to four to six percent of total annual U.S. emis-

sions. However, healthy forests that are managed to avoid severe fires play an important role in global carbon cycling by absorbing CO_2 during photosynthesis, storing carbon above and below ground, and producing oxygen. Indian forests currently sequester approximately 400 million metric tons of CO_2 equivalent. Indian forest lands that are managed to restore historical fire regimes avoid the high mortality and CO_2 releases associated with pathogens, insects, wildfires, and decay. If nascent markets for carbon offsets and other ecosystem services mature, the environmental contributions of Indian forests could become financial opportunities for tribes.

Nearly two thousand individuals, Indian and non-Indian, some of whom are directly employed by tribes and others who work for the BIA, earn a living keeping Indian forests healthy and productive. Thousands more find related income as contractors, workers, fire fighters, and service providers. Sale of reservation timber helps support tribal governments and communities. The contributions to cultural identity, employment, and revenues, as well as subsistence and informal economies that are provided by forests, are uniquely important to Indian families as compared to the more transient and opportunity-rich broader society.

Because of these ties, threats to forests, such as changes associated with climate change, are expected to be more severe for American Indians. In other words, although American Indians have contributed relatively little to the causes of climate change, they face disproportionate risks. Traditional practices such as the gathering of traditional foods, medicines, and firewood, as well as grazing, hunting, and fishing that have been practiced for millennia are jeopardized. Economic ventures are also threatened, as well as future growth.

Fort Apache. Photo by Vincent Corrao.

Wildfire risk-reduction

An example of the effectiveness of Indian forest thinning occurred in 2011. On May 29, the Wallow Fire started on the Apache-Sitgreaves National Forest in central eastern Arizona. By June 6, it had burned 240,000 acres. Indian hotshot and hand crews began burnout operations along 45 miles of reservation roads and previously treated prescribed fire units on the White Mountain and San Carlos Apache Indian Reservations. When the fire hit the Indian fire line and thousands of acres that been previously treated to reduce fuel loads, it dropped to the ground. In contrast, a disproportionate number of acres outside the reservations burned at unusually high severity.

By the time the Wallow Fire had reached its final size on July 8, it had burned 835 square miles in Arizona and 23 square miles in western New Mexico. Wallow was the largest fire in Arizona history, but would have been bigger without Apache thinning.

Recommendation

Establish a regular BIA state-of-the-resource report including assessments of marketing, economics, woodlands, and climate change that would incorporate a protocol for continuing data acquisition (with specific reference to NIFRMA questions). Existing federal agency examples of such assessments include the Forest Inventory Assessment (FIA), the Resource Planning Act (RPA) assessment, and the National Climate Center assessment.

Mescalero Apache. Water management. Photo by Vincent Corrao.

Climate change and Indian forestry

The rate of global warming and the range of observed impacts have increased greatly since IFMAT-I, introducing new challenges for tribal forests and forestry programs. Systems and resources supporting or depending on forests, such as water supplies, wildlife, energy, housing and infrastructure, food and agriculture, and human health are being affected.

Climate change exacts disproportionate social, economic, and cultural impacts on tribes with limited resources, mobility, and access to information. These inequities are amplified as the rate of change accelerates. Adjusting forest plans and practices to deal with climate impacts is imposing additional costs and logistical constraints for tribal foresters. Forestry programs that are underfunded and understaffed will not be able to adapt.

For these reasons, IFMAT-III explored climate change as an emerging driver for Indian forests and forestry. We summarize our findings and recommendations below, with a more detailed report in Volume II.

Climate changes and impacts on forests

Globally, the last decade was the warmest for at least 1,000 years. Temperatures in the lower 48 states have increased 1.3 degrees F over the last 100 years, with the

top ten warmest years occurring since 1990. A recent synthesis provided input for the new U.S. Global Change Research Program National Climate Assessment on the effects of climate variability and change in North American forested ecosystems. This synthesis includes the following observed and expected impacts.

Increases in temperature will reduce the growth of some species (in dry forests) and perhaps increase the growth of others (high-elevation forests). Through the interacting pressures of drought, extreme weather, and temperature, climate change will have serious impacts on forests. Increasing disturbances will have the biggest effects on forest ecosystems. For example, wildfire will increase throughout the U.S., doubling by the mid-21st century. Insect infestation, such as bark beetles will expand, affecting more land area than wildfire. Invasive species will become more widespread, especially in dry forests after disturbance.

Decreased snow cover depth, duration, and extent will lead to drier conditions, especially in the West, decreasing tree vigor and increasing susceptibility to insects and pathogens. Mortality will increase in older forests, especially those already under increasingly serious soil moisture stress. Species habitat shifts will occur, in general moving up in elevation and northward in latitude. Increased flooding, erosion and sediment movement will come from fire disturbance and downpour combinations in steep areas.

Makah. Blowdown. Photo by Larry Mason.

Leech Lake. Storm damage. Photo by Vincent Corrao.

How do tribal foresters regard climate change?

We conducted a series of informal interviews with the forest managers of tribes we visited. We asked each interviewee to summarize representative perspectives on the following questions for his or her forestry program:

- What changes in climate and weather patterns have been most evident in the past ten years?
- Are any of these changes affecting the tribe's forests? How?
- Has your tribe adjusted its forest management practices or planning in response to these climate and other weather pattern changes? How?
- What is the most important barrier your tribe faces in responding to changing climate and weather patterns?
- Has your tribe received any federal or outside funding to assist in responding to climate changes? If yes, what programs or agencies provided this funding?
- Please describe your experience in considering or applying for funding, whether or not you were successful.
- Please provide any additional thoughts about your tribe's response to changing climate or general comments about climate change in Indian Country.

Tree growth and regeneration may be more affected by extreme weather events than by gradual changes in temperature and precipitation. Regeneration success will decrease for many species, especially near the edges of their ranges. Eastern forests will continue to sequester carbon (in net terms), while Western forest ecosystems will become net emitters because of the heightened influence of wildfire and insects disturbance.

Lac du Flambeau. Native plants are adapted to the local climate. Photo by Vincent Corrao.

Findings

- **Tribes and the BIA have not been successful in accessing new and redirected federal funding for climate change response during 2009-2012**. In 2012, DOI received $175 million in climate change related funds that make up their Landscape Conservation Cooperative efforts. In contrast, the BIA received $0.2 million, despite their unique federal trust obligation for tribal lands that encompass 10 percent of DOI's land base and host the largest human population on the land of all DOI agencies.

- **Managers of tribal forests are observing multiple impacts of a changing climate.** Some of these impacts include increased severity of wildfires and insect and disease activity, increased frequency and intensity of precipitation events, more severe droughts, changes in the timing of plant and animal activity, and the more rapid spread of some invasive species. These observed impacts vary widely by region and tribe and are informed in many cases by comparison with observations and stories provided through traditional tribal knowledge and memories of tribal elders. Tribal forestry managers and tribal leadership already recognize the inevitability and some of the implications of the rapidly-changing climate for their prosperity and culture.

- **Some tribes are already building adaptation to climate into their forestry programs and practices.** But few if any tribes have incorporated climate change into their forest management plans.

San Carlos Apache. Juniper-removal treatments help slow the spread of this encroaching tree species. Photo by Larry Mason.

Coquille. Uneven-aged management. Photo by Larry Mason.

- **Intertribal organizations perform an important function, and some have direct benefits, including tools and resources for tribal forest managers.** There are numerous coalitions, networks, and other organizations that have emerged through intertribal collaboration or through university, tribal college, and agency sponsorship devoted to assisting tribes and their natural resource managers in responding to climate change.

- **Tribes can be key players in landscape-scale partnerships to manage climate vulnerabilities.** Climate-influences impacts occur at scales large enough to warrant better mechanisms for convening, governing, and sponsoring landscape-scale partnerships. Tribes have much to offer landscape-scale conservation in the form of traditional knowledge, long-term observations, holistic (systems-level) approaches, and the flexibility to implement active, adaptive approaches to management.

Regional climate impacts for IFMAT-III regions.

IFMAT region	Major climatic changes	Climate-driven stressors	Major non-climate stressors	Effects on forest systems	Forest management implications
Northwest	More precip. as rain. Smaller snowpack/ earlier melt. Temp. increases, esp. winter. Drought duration & intensity.	Wildfire. Bark beetle & other insects/disease. Downpours.	Fire suppression. Fragmentation.	Growth reductions in Southern range. Species distribution change: Doug-fir decrease. Disturbance area increase.	Wildfire management. Forest density and spp. composition mgt. Reforestation strategies. Woodlands mgt.
Southwest	Multiyear droughts. Heat waves. Episodic flooding.	Wildfire intensity. Insect outbreaks. Sedimentation. Lower carbon storage.	Water competition. Exurban expansion. Grazing.	Large-scale diebacks. Growth decreases. Species shifts: conifer to mixed. Species distribution changes. Disturbance area increase. Increased mortality in "fringe pine" and woodlands.	Aggressive fuels mgt. Density mgt.
Lake States	Heat waves. Precip. increases. Downpours. Multiyear droughts. Lower winter temps.	Floods and erosion. Insects, disease and invasives increase.	Fragmentation. Air pollution.	New species assemblages. Moisture stress. Nitrate leaching losses. Soil carbon losses.	Changes to reforestation species and strategies.
East	Heat waves. Intermittent droughts. Snow accumulations. Precip. increases. Downpours. Windstorms.	Heat and moisture stress. Insect and disease increase, expansion. Flooding, sedimentation and erosion. Wind damage. Wildfire season lengthening (Southeast).	Urban expansion. Fragmentation. Air pollution. Invasives.	Growth increases in some species. Species reductions and shifts (conifers and some hardwoods). New species assemblages. Moisture stress. Cold-water fish habitat degradation. Nitrate leaching losses. Soil carbon losses. Shifts in commercial forest and carbon sequestration productivity (Southeast).	Reforestation strategies. Forest health mgt. Open space conservation strategies.

Recommendations

- Require allocation of federal agency funds for climate change response, and develop processes and criteria to assure a more equitable distribution of funding to tribes.

- Require all regional and national assessments of the forest resource to include an assessment of the condition and trends of Indian forest lands under a range of future scenarios.

- Require federal agencies to develop mechanisms for coordinated interagency delivery of science findings, technical, and financial services to support tribal assessments of climate-driven vulnerabilities and incorporation of this information into planning and management processes.

- Encourage the exchange of traditional ecological knowledge and Western scientific knowledge in planning and adjusting to climate change impacts, recognizing the unique strengths each form of knowledge brings.

Looking forward

Many of the findings and recommendations we present in IFMAT-III would enhance the resiliency of tribes through reducing exposure to stressors, moderating the sensitivity of tribal forests and other resources to climate impacts, and improving the adaptive capacity of forests management programs and tribal organizations.

Barriers to full realization of the adaptive capacity of Indian forestry include funding inequities, diversion of technical staff time to the pursuit of funding sources, and risk transfers from lack of management on neighboring ownerships. IFMAT-III recommendations address these barriers, envisioning an enterprise that can handle existing climate vulnerabilities and grow stronger as these stressors interact and intensify. Although tribes have dealt with variability in the climate for many centuries, the speed and volatility of projected climate changes bring urgency to the need for the improvements recommended by this report.

Increasingly, state-of-the-art forestry is becoming state-of-the-climate forestry that must adapt to a changing array of impacts to meet the tribal vision for the forest resource.

Colville. Thinned forest.
Photo by Larry Mason.

Anchor forests

This section addresses ITC question 3: Consideration of changes in forest management, harvesting, and transportation infrastructure in the vicinity of reservations and the potential for Indian forests to become "anchors" of forest infrastructure.

"We must strive for economic sustainability in the whole community, tribal and non-tribal. The tribe has to be a leader in how things are managed. The tribe won't be successful without a successful larger community."
—-IFMAT-III focus group participant
Yakama photo by Larry Mason

Contemporary forest issues are broadly acknowledged as too large to be successfully addressed at a local level or by single ownership. Federally supported collaborations, such as Landscape Conservation Cooperatives, the Wildland Fire Leadership Council, and the Collaborative Forest Landscape Restoration Program (CFLRP), are seeking multi-ownership conservation strategies at landscape scales. More policy makers and land managers are recognizing the growing interdependence between forest industry sectors, public agencies, and forest-managing Indian tribes.

During the course of this IFMAT investigation, we heard from tribal leaders across the nation that, given current economic and environmental declines, the future of tribal forests may be in question. A struggling world economy and consequent fall in log and lumber prices have had a significant impact on Indian forest programs and harvests. Timber revenues have steadily dropped in the past three decades.

In connection to the decline in timber harvests, mill closures and job losses have swept through the forest industry and across the nation. USDA Forest Service statistics show that since 2005, 1,009 sawmills, 15 pulp mills, and 148 other mills closed. Altogether, this represents a loss of 19 percent of all mills in the United States forest sector. U.S. lumber production dropped by 40 percent between 2005 and 2010. For tribes that sell logs to scarce and distant markets, such loss of customers can be devastating. For tribes that operate milling facilities it can be just as bad. Since 2001, ten Indian sawmills have closed, leaving just four that struggle to remain operating.

Menominee. Hardwood lumber production. Photo by Serra Hoagland.

Depressed markets for forest products have led to revenue shortfalls, job losses, and diminished ability to care for tribal forests. Harvesting and processing infrastructure is in a critical state of decline, and once these resources disappear they are very difficult to replace. Forest health concerns, often most acute on neighboring federal lands, threaten resources such as water, fish, wildlife, cultural foods, materials, and medicines. A sense of emergency is growing within many forest-dependent Indian communities, especially in the West.

Indian people share a common responsibility to manage the environment on behalf of present and future generations. Faced with the growing threats of declining forest systems and limited economic and employment opportunities, concerned tribal leaders are now turning their attention and stewardship abilities to environmental challenges beyond reservation borders. The future of the forests on and off the reservation may depend upon the success of their effort.

Quinault. Hemlock logs. Photo by Mark Rasmussen.

The Intertribal Timber Council (ITC) is a 36-year-old association of 70 forest-owning Indian tribes and Alaska Native organizations, and is dedicated to improving the management of natural resources important to Native American communities. Leaders of ITC have brought forth a concept of "anchor forests" as a means to maintain healthy working forests on the landscape, based on the recognition that sustaining desirable cultural, ecological, and economic forest objectives requires the assurance of sufficient levels of timber harvest to maintain industrial infrastructure and forest-dependent communities. Harvests must reliably come from multiple owners—large and small, public and private. In areas with significant Indian forests, tribes can become "anchors" to multi-owner stewardship programs. Anchor forests are intended to provide a foundation to foster the development of common visions through collaboration. Envisioned as large, contiguous areas of land guided by agreements across ownerships, they are based upon four major objectives:

- A reasonable expectation for sustainable wood commodity production.
- Timber harvest volumes sufficient to support economically viable manufacturing, processing, and workforce infrastructure within accessible and affordable delivery distances.
- Long-term management plans, supported by inventory and monitoring systems, professional staff, up-to-date technical capabilities; and integrated research, i.e., capable of workable adaptive management strategies.
- The institutional and operational commitment and capacity needed for implementation.

Warm Springs. Photo by Vincent Corrao.

Anchor forests must be capable of sustaining production levels of forest products at a scale necessary to maintain at least a minimal level of competition (~100 MMBF/year) within viable transportation distances (~60 mile radius) from the woods to processing facilities. Minimum levels of harvesting, manufacturing, processing, transportation, and work force infrastructure must be identified and maintained to address forest health problems and support rural forest-dependent communities. Without access to markets for forest products, without the ability to prepare and implement management prescriptions, without loggers and mills and the means to transport wood to markets, without the income generated from harvest to defray costs of forest health treatments, for-

ests face increasing losses from insects, disease, wildfire, conversion, and climate change. In essence, they move from being community assets to community liabilities.

Undertaking cross-boundary management planning to restore, maintain, and enhance road systems, habitats, forest health, ecosystem functions, and services will require information, landscape-scale analysis, and staff. Multi-disciplinary, multi-party science support will be needed to inform stakeholder evaluation of options and trade-offs. Integration of traditional knowledge and understanding with contemporary science and technical capacity should be encouraged such that managers and scientists might learn from tribal elders and holistic problem-solving might proceed.

Tribes are uniquely positioned to convene stakeholders in support of multi-ownership forestry collaborations. Tribes are political sovereigns with reserved rights on ceded lands, but are not politically aligned with stakeholder extremes from either industry or environmental groups. They have long-term commitments to stewardship—in some cases on relatively large blocks of land—and in some regions, especially in the West, they have the last remaining processing infrastructure and natural resource management staff. For these reasons, Indian forests are prime candidates to be recognized as anchor forests.

Nonetheless, anchor forests will require a social and political climate that enables on-the-ground treatments at a landscape scale. Ideological differences in values and perspectives have led to an atmosphere of confrontation that has stymied forest management, particularly on federal lands. Resolution has been elusive. The need for collaboration has been acknowledged but has manifested as a diverse and confusing array of programs intended to help, but which so far have not moved beyond the pilot project phase. Effective utilization of funds and authorities could be improved through coordinated focus within an anchor forest "all lands" context. Federal programs for collaborative management should seek out tribal participation as leaders and facilitators. This will be especially important to the evolution of climate change strategies for adaptation and mitigation.

In the face of deteriorating conditions on federal forests that threaten Indian resources, tribes have contracted with the Forest Service to conduct hazardous fuels reduction treatments on federal lands through stewardship contracting under the Tribal Forest Protection Act (TFPA). However, the scope of

Yakama old growth. Photo by Vincent Corrao.

The Anchor Forest Pilot

Anchor forests represent a new and welcome expansion of collaboration between forest tribes and others. In central Washington State, the first anchor forest pilot project, the Tapash Sustainable Forest Collaborative, has been convened. The partners include the USDA Forest Service, The Nature Conservancy, the Washington Department of Natural Resources, the Washington Department of Fish and Wildlife, and the Yakama Indian Nation. The primary focus is to create interactive, consensus-based solutions for restoring forest health and avoiding forestlands conversion within the east Cascades. The Tapash represents a hopeful beginning; however, more projects need be undertaken, as stakes are high and time is short in the forest areas where Indian reservations abut densely-stocked national forests.

these activities has been tentative and inadequate. TFPA partnerships should be aggressively expanded, as 80 million acres of national forest lands are in need of treatment and pose a threat to tribal resources. "Goods for Services" contracts with tribal enterprises can help offset the costs of federal forest health treatments while providing raw material to tribal enterprises.

We have observed dedicated forestry professionals and technicians, Indian and non-Indian, working together in tribal and BIA operations, employed under the watchful eye of elders, to care for Indian resources and fulfill the wishes of the tribe. Tribal forestry programs strive to do the best they can with the resources available. Tribal people live with the consequences of their decisions. Stalled action is not any more of an alternative than rapid exploitation. Some reservations can be viewed as regional models for sustainable forestry.

Recommendations

- Anchor forests, such as currently being piloted in Washington, should be supported. Innovative tribal forest resource management techniques and people should be considered as co-managers or managers of appropriate portions of the federal forest estate.

- Federal lands within reservation boundaries should be returned to tribal trust status as a part of anchor forest stewardship and consolidation. Non-governmental organizations and federal resource agencies should underwrite costs of tribal purchases of private forest lands through loans, grants, and tax incentives such that lands are placed in trust status and perpetually remain in forestry.

Sitgreaves National Forest stewardship contract site with Fort Apache. Photo by Vincent Corrao.

- Contracting authorities and collaborative programs, such as TFPA, Landscape Conservation Cooperatives, CFLRPs, and stewardship contracting, should be linked to anchor forests and expanded. Shared funding and involvement should extend to climate change. Equivalent levels of funding to that of sister agencies within DOI should be provided to BIA.

The National Indian Forest Resources Management Act (NIFRMA) tasks

In this section, we summarize key findings from the eight NIFRMA-mandated task reports, including the ITC education question (see Task C), drawn from data we collected, and from conversations and observations gathered on our site visits to 20 forested reservations. (Detailed statistics, figures, tables, and analysis are provided in Volume II.)

Eastern Band of Cherokee. Hardwood forest. Photo by Larry Mason.

NIFRMA Task A

An in-depth analysis of management practices on, and the level of funding for, specific Indian forest land compared with similar federal, [state] and private forest lands.

Current (2011) federal funding for Indian forestry and wildfire management of $154 million is about $100 million (39 percent) below the $254 million we estimate as the minimum base level of funding for forest stewardship and timber production to achieve Indian goals. Recurring program funding has been declining in real terms. Further exacerbating the problem, tribes are not getting additional funds as their land base (consolidations and re-acquisitions) and obligations (environmental regulations and climate change mitigation and adaptation) increase.

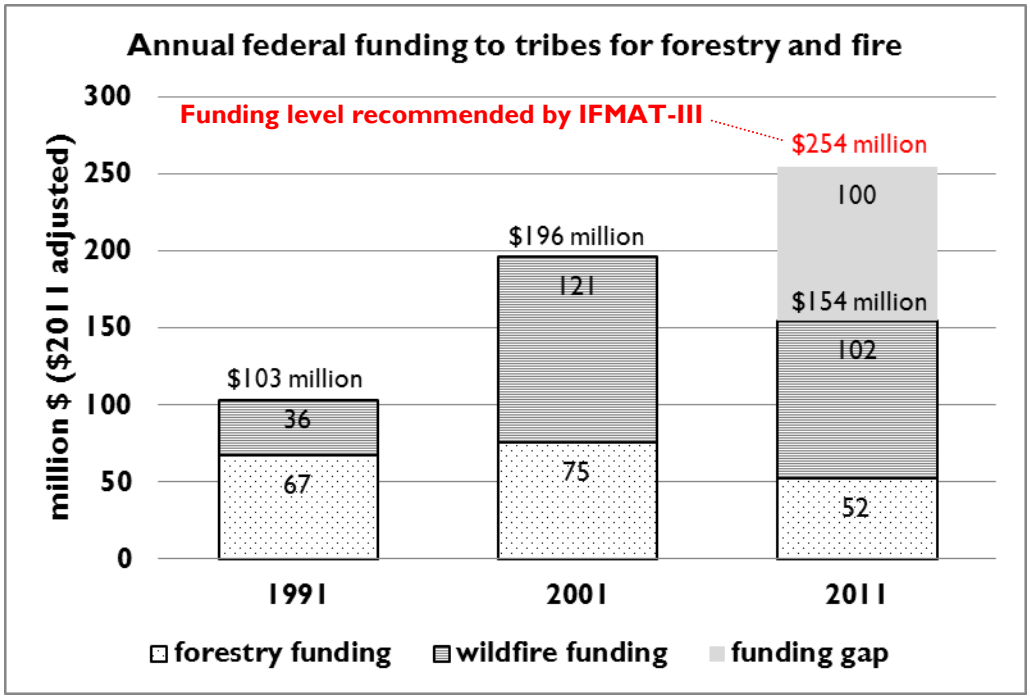


Figure 5. Source: 2011 FPA, except 2001, 2011 fire data from NIFC.

Indian forests are receiving much less forest management funding per acre than adjacent forest land owners (Table A.1), particularly compared to the level of funding states are investing in their trust lands in the West. Furthermore, the difference in funding is probably understated due to generally lower salaries paid to tribal professionals and technicians under self-governance, and the higher costs of managing smaller acreages.

Table A.1 Comparisons of BIA funding to forestry and fire investments made by other public and private organizations.

Forest management funding comparisons ($/acre)		
Forestry organization	**$/acre**	**Range $/acre**
BIA	**2.82**	
States East		
Wisconsin State Lands	3.83	
Minnesota State Lands	5.50	
Maine State Lands	7.63	
Private East		
Southeast	4.85	1.33-16.77
Northeast	4.55	3.73-6.58
North Central	4.43	3.41-6.51
Appalachia	2.70	1.58-4.82
States West		
Montana Trust Lands	11.28	
Idaho Department of Lands	17.91	
Washington Trust Lands	19.98	
Oregon Trust Lands	32.67	
Private West		
Westside OR/WA	19.00	8.00-62.00
Eastside OR/WA	7.25	2.00-12.00
National forests	8.57	
Fire funding allocations ($/acre)		
Organization	**Preparedness**	**Hazardous Fuels**
BIA	**0.94**	**0.71**
National forests	3.71	1.45
BLM	0.73	0.35
Roads maintenance funding ($/acre)		
BIA	**0.46**	
National forests	2.04	
BLM (all)	0.30	
BLM (all except AK)	0.38	
BLM (OR)	1.54	

The uncertainty and instability of fire funding is a major concern for many tribes that struggle to address deteriorating forest health. Indian forest budget allocations for hazardous fuel management are significantly lower than Forest Service allocations. Hazardous fuel reduction treatments are crucial to sustainability and must be maintained and expanded. Increasingly, fire threats to reservations arise outside the boundaries of Indian forests, most often on adjacent federal forests. The Tribal Forest Protection Act of 2004 has opened the way for tribes to contract with federal agencies to undertake fuels reduction programs on these lands. This approach has promise, but we have observed only pilot-scale implementation. However, we did observe positive examples of collaboration between tribes and federal agencies during western site visits.

An increasing fraction of funding for core forestry activities (roads, silviculture, protection) comes from non-recurring grants. Declining program funding is increasingly replaced in part by grant and contract money sources, especially National Resource Conservation Service Environmental Quality Incentive Program (EQIP) funds. Although project partnerships provide mutual benefits, reliance on soft money jeopardizes long term state-of-the-art stewardship because of high transaction costs (applying for and reporting on grants, and funding periods and restrictions that don't match tribal fiscal calendars or policy) and because of uncertainties that confound the planning process.

Although challenged by many constraints, tribal forestry programs are remarkably successful due primarily to positive and effective leadership from both individuals and organizations. If these positive attributes are to be retained, tribes and the BIA will need to find stable funding mechanisms that provide a base for continuous improvement of Indian forest management.

Defining "state-of-the-art" forestry

NIFRMA requires our assessment to make recommendations for bringing Indian forest land management programs to a "state-of-the-art" condition. But what constitutes state-of-the-art forests?

Ultimately, state-of-the-art forestry for Indian forests is that combination of people and practices that most efficiently and effectively achieves, or moves most rapidly toward, the tribal vision for their forest. Objective criteria for measuring efficiency and effectiveness should be stated in the relevant tribal plans.

In a general sense, state-of-the-art effectiveness employs a functional vision, the best available technology and current science, and enough skilled people. When possible, each tribe should benchmark their performance with other forest management efforts on similar lands with similar goals, both in terms of inputs (inventory, silviculture, biology and engineering methods and tools) and results (timber harvest levels, water quality, biodiversity, carbon sequestration, recreation, and spiritual satisfaction).

Achieving state-of-the-art forestry is possible only with adequate funding.

Quinault. Bridge built as cost-share project with NRCS.
Photo by Mark Rasmussen.

Recommendations

- Increase annual base level funding by $100 million to $254 million — the minimum we estimate necessary for a level of forest stewardship and timber production comparable to other federal agencies and consistent with federal trust obligations (Table A.2). The benefits of self-governance to Indian forests should be protected by provision of recurring funding and increased technical support where needed. A system of stewardship (base) and incremental funding should be implemented.

- Provide adequate additional funding for law enforcement on Indian forest lands ($2-3 million per year).

- Standardize accounting systems for fire preparedness personnel on fire suppression between the Department of the Interior and the Department of Agriculture to eliminate bias and facilitate benchmarking.

Table A.2 Recommended investment levels to fund forest stewardship and timber production for Indian Forests. **A budget to support the current allowable annual cut of 564 million board feet would be about $254 million on a national basis.** By comparison BIA funding to the tribes totaled $154 million in 2011.

Annual harvest level	Forest stewardship (million $)	Timber production (million $)	Total (million $)
400 MMBF	219.7	24.0	243.7
500 MMBF	219.7	30.0	249.7
600 MMBF	219.7	36.0	255.7
700 MMBF	219.7	42.0	261.7

Leech Lake Tribal College.
Photo by Larry Mason.

Makah.
Photo by Mark Rasmussen.

Menominee Tribal Enterprises.
Photo by Larry Mason.

NIFRMA Task B

A survey of the condition of Indian forest lands, including health and productivity levels.

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 on 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.

Quinault. Old-growth forest. Photo by Vincent Corrao.

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 reestablish 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 remain at 750,000 acres (as reported by the annual Indian Forestry Status Report to Congress), and compromise the resource potential of Indian forests.

Colville. Larch seedling.
Photo by Mark Rasmussen.

Funding formulas and systems, such as Minimum Expected Level (MEL), are outdated and inconsistent within and among agencies. The BIA Branch of Wildland Fire Management estimates they are operating at 50 percent MEL. The Hazardous Fuel Prioritiza-

tion and Allocation System (HFPAS), designed to improve fire funding allocations, is vulnerable to "gaming the system."

As suppression costs escalate, funds are redirected away from conservation strategies such as hazardous fuels treatments. Under the Federal Land Assistance, Management and Enhancement (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 displace funding needed for other programs, such as fire preparedness, hazardous fuel management, and burned area rehabilitation. Logically, as dollars for fuel reduction activities decrease, fire hazard increases, resulting in greater wildfire activity and suppression costs. A vicious cycle of crisis management ensues, with suppression expenditures consuming ever more of the funds that might otherwise be used to regulate future wildland fires.

Recommendations

- Improve tribal inventory and monitoring capabilities.
- Coordinate forestry with other natural resource disciplines.
- Revise federal fire funding allocations, which currently appear unreliable and insufficient.
- 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.

Wind River Agency. Alpine Lake Fire, managed for ecological benefits. Photo by Robyn Broyles.

NIFRMA Task C

An evaluation of staffing patterns of forestry organizations of the Bureau of Indian Affairs and of Indian tribes. *Also includes an assessment of the current state of forestry education.*

Indian forestry operations are understaffed compared to other public and private forest management organizations (Table C.1). Retirements and limited training opportunities also contribute to loss of institutional knowledge and leadership. Recruitment and retention of Indian forestry staff trend toward opposite extremes: often, talented staff members serve for a long time, but many others enter, train, and quickly move on. Relatively low salaries, remote locations, and small organizations lead to poor career ladders, resulting in employee turnover and recruitment difficulties. Exacerbating the problem are the unprecedented percentages of long-term employees eligible for retirement.

Lengthy processing time by Human Resources appears to be a widespread problem at all levels of BIA forestry and fire organizations. Delays of up to one year in filling funded positions are common, impacting delivery of all program aspects from forest management planning to project implementation.

Spokane. Photo by Mark Rasmussen.

Warm Springs. Photo by Vincent Corrao.

Table C.1. Comparisons of BIA staffing levels to those of other public and private forest management organizations.

Forestry organization	% professional	Forest acres per professional
BIA/Tribes, all	**30**	**30,000**
National forests	19	24,500
Oregon Trust Lands	80	3,500
NW Forest Industry-West Side	40-80	9,000
NW Forest Industry-East Side	40-80	16,000

BIA technical support capability varies by region and tribe (Table C.2), but inadequate technical support has been chronic since the first IFMAT report. Insufficient technical support by BIA contradicts the recommendations of this and earlier IFMATs. Tribes that rely upon direct service support from the BIA are particularly affected. Forest inventory and analysis capability is often seen as slow and less than adequate. Forest management plans are sometimes prepared with old, outdated inventory information and inadequate help in analyzing the inventory data available. Use of geographic information systems (GIS) was often identified by tribes as a technical area in which they needed more support. Electronic sharing of files has been cited as another technical challenge.

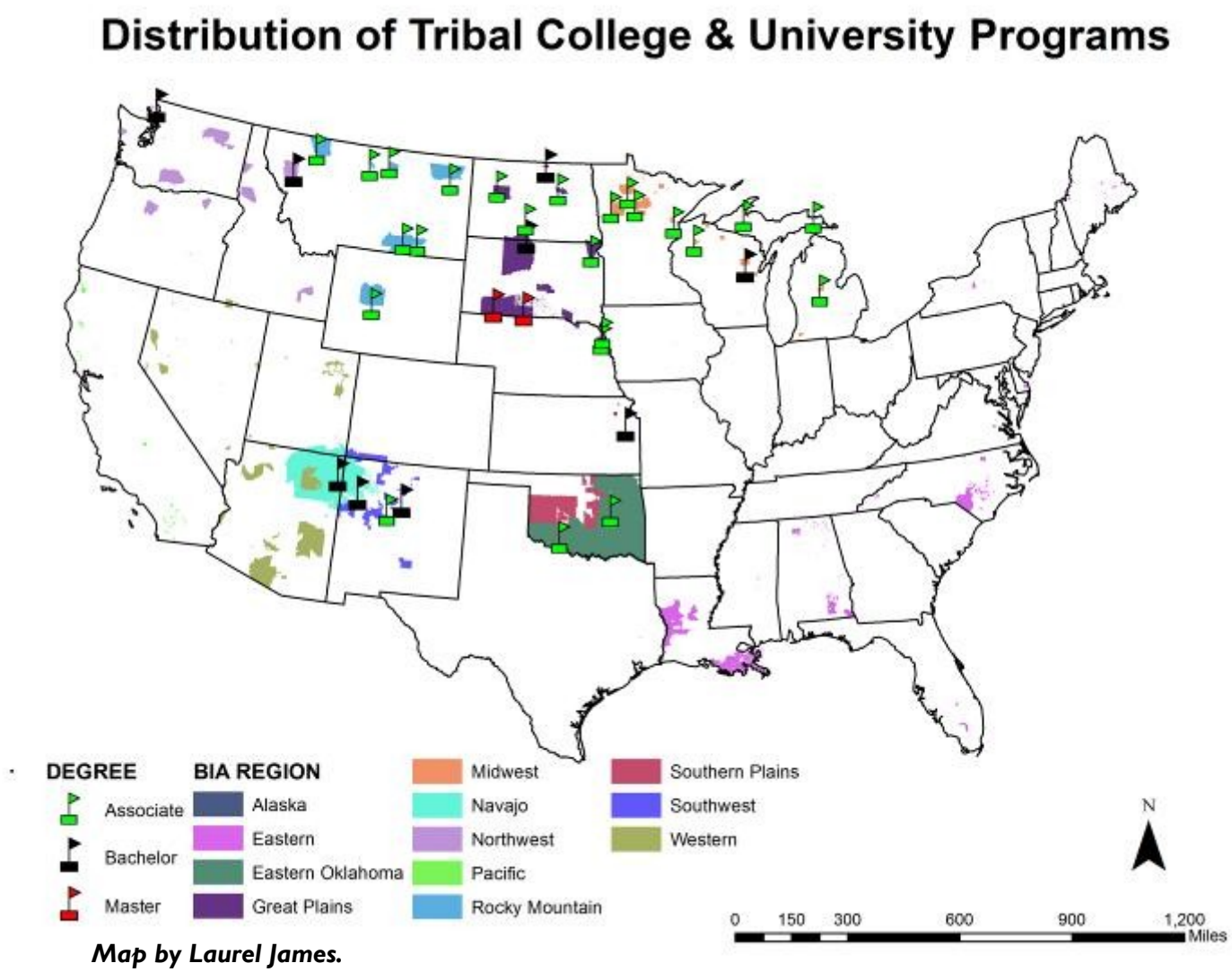
Table C.2. Current and requested full time professional and technical staff by region.

Region	Current staff	Requested staff	% increase
Northwest	565	268	47
Southwest	330	276	87
Lake States	226	182	81
Eastern	49	50	102
Central Office	40	16	40
Total	**1,210**	**792**	**65**

Branch of Forest Resources Planning (BOFRP) has the central responsibility for technical support to tribes, and is chronically understaffed. As example, in 2011 BOFRP operated at 50 percent of need due to unfilled staff vacancies. Soon, BOFRP is set to inherit a significant suite of new responsibilities as it has been called upon to provide the forestry expertise to support the Office of the Special Trustee (OST) in administration of allotment acquisitions as part of the Cobell settlement. This will further compromise BOFRP's ability to provide needed technical support.

Fort Apache forestry students. Photo by Larry Mason.

Tribal college natural resource programs have increased in number and enrollment over the last decade, and represent an important link between tribal natural resource programs and future forestry professionals. Tribal colleges play an increasingly important role in creating forestry educational opportunities for tribal students. Tribal forestry programs can be supported several ways: direct funding, education partnerships with universities,



Map by Laurel James.

education or internship partnerships with federal and state agencies, or scholarships for deserving students. We saw forestry camps, resource education programs, and summer internships that teach forestry to K-12 children and young adults, while also preparing them for potential career opportunities in natural resource science and management. But these programs struggle for funding and were often run by volunteers.

Lack of access to training and continuing education persists as a challenge to BIA and tribal forestry and natural resource staff. Leadership and training are essential to maintaining a state-of-the-art workforce, providing opportunities for staff qualification certifications, and bringing future leaders up through the ranks.

Table C.3. BIA investment needed to adequately support education and professional training.

Staff development needs	Funding (million $)	$/acre
Education coordinator	0.40	0.02
Youth internship programs	1.00	0.06
Professional training and continuing education	11.30	0.61
Total	**12.70**	**0.69**

Recommendations

- Increase staffing by 793 employees, including a national education coordinator.
- Increase annual funding by $12.7 million to support the NIFRMA vision for education and professional training (Table C.3).
- The BIA should work with tribes to develop a strategic plan to recruit, train, and retain tribal forestry professionals and technicians.
- Implement education programs envisioned by NIFRMA, which specifically addressed the importance of supporting Native Americans who wish to study natural resources. In 25 U.S.C. § 3113 &3114, NIFRMA authorized the BIA to create and administer 1) an internship program, 2) a cooperative education program, 3) a scholarship program, 4) forestry education outreach, 5) post-graduate recruitment, 6) post-graduate intergovernmental internships, and 7) continuing education and training.

Mescalero Apache. Youth Conservation Corps. Photo by Larry Mason.

NIFRMA Task D

An evaluation of procedures employed in timber sale administration, including preparation, field supervision, and accountability for proceeds.

Warm Springs. Photo by Vincent Corrao.

Tribes use many different methods to determine the value of their logs and stumpage, and questions remain as to whether they are receiving appropriate value. Each tribe has different goals and objectives specific to the needs of their communities and forests: some operate sawmills, while others sell delivered logs or stumpage. Many are in remote locations.

A current lack of planning to control costs and forecast markets compromises tribal revenues. Timber sale preparation on adjacent state and private forest land generally occurs one full year in advance of sale, with planning for sales beginning two years out. This lead time provides for road installation, road maintenance, and developing and implementing transportation plans that can reduce the cost of harvesting and transportation. We saw very few examples of forest management plans or integrated resource management plans that provide any direction or guidance on marketing, cost strategies, or scheduling of timber harvest.

In addition, some consider the Code of Federal Regulations (CFR) obsolete. The CFR still requires BIA to conduct an appraisal from stump to lumber to determine stumpage values. Many tribal foresters indicated that the CFR should be updated, and frequently cited the large amount of paperwork necessary to complete a BIA sale compared to a tribal timber sale. Similar findings resulted from the ITC report *Marketing and Branding of Tribal Forest Products.*

Tribal enterprises can create numerous community benefits through a multiplier effect that is not well documented. In isolated communities and reservations with high unemploy-

Tulalip. The documentation required to complete the BIA timber sale process can be cumbersome and time-intensive. Tribal timber sale preparation is on the left. BIA timber sale preparation for an allotment is on the right. Photo by Larry Mason.

ment, the creation of jobs can avert significant health and social service costs. Tribal enterprises that manufacture lumber products provide a considerable number of jobs on reservations with their sawmill enterprises and often are the only opportunity to provide better forestry. They are essential to local communities. A critical lack of economic information about the market and nonmarket value relationships unique to reservations clouds understanding of trust obligations, handicaps forest planning, and confounds best value estimation for comparative timber sale arrangements.

We saw little improvement in relationships between the natural resource departments, tribal forestry programs, and forest products enterprises. Better coordination between tribal councils, enterprise board of directors, and the natural resource programs would help in integrating social, economic, and political concerns with environmental concerns. This integration is critical to improving forestry operations on reservations.

Recommendations

- Create an auditing procedure to document the competitiveness of forest enterprises and monitor the stumpage comparisons between tribes and neighboring lands.

- Undertake a study of reservation economics and forest products marketing so that the down-stream economic effects of jobs, market returns, and non-market values, unique to Indian reservations, can be assessed for different marketing and processing strategies.

- Improve the appraisal and timber sale process so that it is more efficient and adaptable to market fluctuations.

- Update and improve the CFR for timber sales to reduce the time and cost of BIA timber sale preparation.

NIFRMA Task E

The potential to reduce or eliminate procedures, rules, and policies of the BIA consistent with federal trust responsibility.

Flathead. Stream restoration. Photo by Mark Rasmussen.

Because some Indian forests have been managed more effectively in pursuit of tribal goals than surrounding private forests, they sometimes provide habitats and services no longer found on private lands. This leads to a view that Indian forests have an obligation to continue to provide those services, even at the expense of generating revenue for the tribal beneficiaries. Payments to tribes for ecosystem services as advocated by the USDA Forest Service could bring needed support for integrated management. The National Environmental Policy Act (NEPA) imposes costly processes in planning projects that use federal funds. We found variable degrees of full natural and cultural resources integration in plans or management staffs across the tribes visited. On a positive note, in some case tribes are able to use Environmental Assessments (less costly, more timely) for the same kind of project work that requires the Forest Service to use Environmental Impact Statements (more costly, more time and resource consuming).

Goals for and laws granting sovereignty and enabling self-determination are often made difficult to achieve by requiring tribes to adhere to federal forest and environmental laws and policies, especially when not adequately funded. Because of concerns over liability for breach of trust, and the unique jurisdictional and political complexities of Indian Country resulting from over two hundred years of history replete with changing policies, legislation, and court decisions, an extensive set of rules, regulations, and procedures is contained in manuals and handbooks for trust administration of Indian forests. A federal nexus created by

funding provided to fulfill treaty and trust obligations and the involvement of the United States as trustee, coupled with the lack of consideration for the special status of lands held in trust for Indians, has resulted in the application of such laws to Indian forestry. IFMAT-III regards these requirements as "unfunded mandates. In the extreme case, they inhibit full sovereignty and self-determination and make reaching tribal goals insurmountable. Dealing with species listed as threatened or endangered under the Endangered Species Act of 1973, as amended, including costly Section 7 consultation, is the most troubling example.

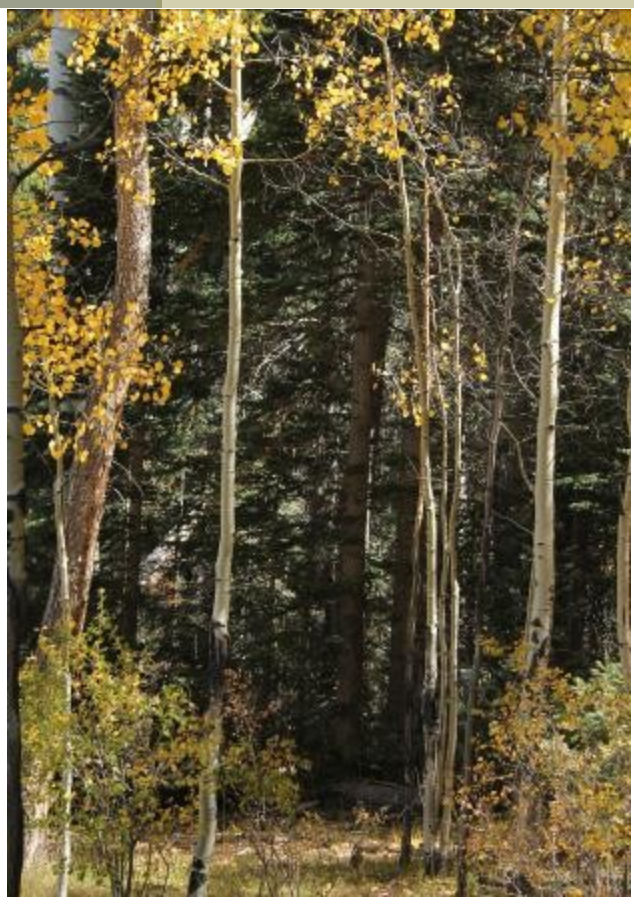
Forest roads in Indian Country are of much lower quality than on other federal lands, creating adverse environmental impacts and reducing potential for tribes to derive full benefits from their resources. Road funding for Indian Country comes from the Federal Highway Administration (FHWA) through the BIA for roads providing public access. Indian forest roads specifically needed for the protection, administration, use, and development of tribal forest resources are supported by timber sales or tribal contributions.

Trespass, particularly for illegal plant cultivation, has been identified as a significant management problem on several western reservations. Law enforcement officials frequently find sophisticated marijuana operations on Indian forests in addition to trespass problems such as theft of natural resources and poaching.

Recommendations

- Enable use of Categorical Exclusions and Environmental Assessments to facilitate greater self-determination and self-governance. Self-governance tribes should be able to develop tribal NEPA procedures and associated code to replace BIA NEPA manuals and handbooks.

- Build upon the anchor forest concept to explore the creation of "anchor plant, fish, and wildlife management areas" on federal lands to secure treaty rights on ceded lands that have suffered due to historic or current management practices on those areas.



Fort Apache. Aspen. Photo by Mark Rasmussen.

Flathead. Post restoration treatment stand. Photo by Mark Rasmussen.

Allotments: fragmenting forest planning and management

Complicating the management of Indian forests are the thousands of fragmented and fractionated allotted parcels, generally 40-160 acres, of forest land that are owned by individual Indian families and are held in trust by the federal government, most often within reservation boundaries, and managed in conjunction with tribal forest trust lands.

The allotment system, created by the Dawes Act of 1887, gave individual Indians ownership interest in specific parcels of land. The Secretary of the Interior through the Bureau of Indian affairs is mandated to hold Indian forest land in trust for individual Indian trustees, and these lands are to be managed in the best interest of the Indian beneficiaries (25 CFR Subchapter M, Part 163). This responsibility is outlined in the Indian Affairs Manual (Part 53 Forestry) and includes timber harvesting and management, wildfire control, and various silviculture activities. An essential part of this policy is to provide for management of Indian forest lands under the sustained yield concept.

Over time, as ownership was divided among heirs through probate, many parcels became fractionated (i.e., shared among multiple owners). Each allottee holds a fractional interest in the revenue from the allotment property. The proceeds from a timber sale, for example, would be paid to each allottee based on his or her percentage ownership of the allotment.

Allotments have long-lasting negative impacts on the nature, use, and structure of Indian forests. This ownership structure increases management costs, limits forest products marketability, frustrates landscape-level management, results in an uneven distribution of management constraints between allotment owners, and reduces the economic development potential of Indian forest assets.

The proportion of allotments varies considerably by reservation. Many reservations have no allotted lands, but on 150 reservations, 2.9 million fractional interests are owned by more than 219,000 individuals adding up to more than 10 million acres or about 20 percent of all Indian trust lands. In spite of numerous requests to BIA and other sources, we were unable to obtain data on the total number of acres in forested allotments. However, we do know that about half of all allotted lands are located on 19 reservations that have been classified as Category 1 or 2 timber tribes. Seven of these reservations were visited by IFMAT.

Our site visits indicate that the challenges the allotment system presents to forest managers are amplified as allotments become increasingly fractionated. For example, the number of fractional interests grew by about 12.5 percent from 2007 to 2011. Obtaining permission from a majority share of allottees is difficult. Different allottees might have different needs for revenues from harvest. And because servicing allotments is more time consuming, a backlog of forest management work develops. Allottees sometimes wait for long periods for attention from forestry staff. In general, management of allotments is not responsive to individual owners' needs.

IFMAT has recommended three times that allotment lands be consolidated into tribal ownership through a willing buyer-willing seller program, and further recommends easing National Environmental Policy Act and Endangered Species Act regulatory burdens on allotted forest lands.

The Cobell settlement

In 1996, Eloise Cobell, a member of the Blackfeet Tribe, filed a lawsuit in federal court on behalf of herself and hundreds of thousands of other American Indians. One issue was whether the United States had breached its fiduciary duty to account for revenue derived from lands held in trust by the federal government for individual Indian allotment owners (allottees). The BIA has responsibility for management of trust lands, and a responsibility to account for revenue from land leases, oil and gas, and mineral extraction, grazing, and timber harvesting.

The Cobell court cases continued from 1996 to 2009. During the course of the litigation, the court found that the BIA had failed to account properly for revenue from trust lands for over 100 years. However, the evidence was inadequate to permit an accurate accounting of the exact amount of funds that should have been distributed to Indian beneficiaries.

In 2009, the Indian plaintiffs and the federal government reached a settlement agreement in the amount of $3.4 billion out of which $1.55 billion has been dedicated as the Trust Land Consolidation Fund for acquisition of fractional allotted interests and consolidation into tribal ownership. It is too early to tell whether or to what extent Cobell settlement funds might consolidate forested allotments in tribal ownership or otherwise benefit Indian forestry.

NIFRMA Task F

A comprehensive review of the adequacy of Indian forest land management plans (FMPs), including their compatibility with applicable tribal integrated resource management plans (IRMPs) and their ability to meet tribal needs and priorities.

Forest management plans exist for most tribal forest lands. Many are up to date and well-executed, but sometimes lack the detailed harvest scheduling, interdisciplinary support, and environmental projections that allow management professionals to provide adequately for future harvest and forest protection activities. Tribes of different sizes, resources, and locations have different needs. Planning helps customize conservation strategies to fit the needs and objectives of these individual tribes. Planning can also help refine evolving tribe-to-federal relationships. Several large tribes attributed planning challenges to a lack of personnel, planning funds, and technical support.

Progress on IRMPs has been also slow due to funding and personnel shortages. However, especially for tribes with significant forest resources, IFMAT sees an opportunity for IRMPs to serve tribes as a vehicle for funding and staffing negotiations, and as a way to use planning assessments and conservation strategies to seek relief from unfunded mandates such as the National Environmental Policy Act (NEPA) or the Endangered Species Act. Already, some tribes have used the IRMP process to provide opportunities to create connections between science and traditional knowledge. It is important to note that the development of IRMPs may not be appropriate for every tribe.

Spokane. Completed harvest site. Photo by Vincent Corrao.

Plans vary widely in terms of approach, depth, content, and rigor; most forest plans are still primarily timber management plans, with some standards, guidelines or limitations imposed by other resources. The Continuous Forest Inventory (CFI) systems, and BIA planning technology generally, do not support a comprehensive approach to planning. We observed some efforts to include a tribal vision in the forest plan, but it is sometimes difficult to demonstrate or discern in the plans. There is a wide range of

White Earth. Hardwood pulp logs. Photo by Larry Mason.

approaches and of success in obtaining and incorporating public input to forest plans. Plans for the most part do not address climate change, forest health, or forest restoration. Most plans identify five or ten years' worth of upcoming projects. But most do not identify resources (funding, positions, investments) needed to support the effort. In fact, only 25 percent of the FMPs we reviewed fully addressed funding and staffing requirements to carry out the FMP. Some of the FMPs covered the organizational structure of the forest management department and current funding, but lacked a discussion on funding needs. Most of the FMPs provide some level of quantitative criteria to evaluate performance of FMP implementation, but often in limited detail. The plans do not address the nature of the wood needed by local processing facilities.

Allotments are under-planned. Allottees have little or no view of when harvest will occur. Allotment harvest appears to be more opportunistic than planned. The cost of preparing and administering allotments continues to be high. Forest conditions on and historic and projected harvest levels for allotments are typically not reported separately. In fact, the very nature of the Continuous Forest Inventory does not lend itself to describing or planning for allotments separately from tribal trust lands. Forest plans should communicate to allottees what kind of management and revenue they can expect during the planning period. Some forestry programs have an allotment forest management plan as an appendix to the overall management plan.

Although some FMPs addressed woodland management, most provide limited direction as to how the tribe is to specifically manage their woodlands. Woodlands make up a sizable portion of forested tribal trust lands. Because they do not generate as much revenue or employment, woodlands typically receive much less attention from planners.

Purpose and benefit of a forest management plan

Forest management plans are required for all Indian forest lands in federal trust status. NIFRMA also defines an IRMP as a document, approved by an Indian tribe and the Secretary, which provides coordination for the comprehensive management of such tribe's natural resources. Ideally, a forest management plan is a living document that provides the forest manager with a number of benefits over a long period of time:

- Authorize management.
- Establish practices, schedules, guidelines, and contingencies.
- Establish trust standards.
- Resolve issues.
- Set budget and revenue expectations.
- Consider impacts of proposed changes in management.

A comprehensive and well-written forest planning document does not necessarily mean that the plan is effective. To be effective, a plan must enjoy the support of tribal leaders, forest managers, and the tribal public. It must have addressed and resolved, to the extent possible, key management issues. It should provide the vision and direction needed for continuity as new managers come to the forest. **A well-written plan that sits on the shelf is not a good plan.**

Makah. Photo by Mark Rasmussen.

The Indian Forest Management Handbook is an excellent document that provides clear instruction on the necessary elements of a FMP, satisfying the requirements set forth in Chapter 2, Part 53 of the Indian Affairs Manual (Forest Planning). In 2011, an estimated 14.9 million acres of Category 1 and 2 and 645,000 acres of Category 3, 4, and 5 forested reservations were covered by a FMP for a total of 15.5 million acres.

Table F.1. Progress of FMP development on forested reservations outside of Alaska.

Performance indicator	1991	2001	2011
Percent of Category 1 & 2 forested reservations covered by a FMP	53	68	90
Number of Category 1 & 2 forested reservations covered by FMP	44	64	85
Total Category 1 & 2 forested reservations	**83**	**94**	**94**
Performance indicator	**1991**	**2001**	**2011**
Percent of Category 3, 4, & 5 forested reservations covered by a FMP	13	21	43
Number of Category 3, 4, & 5 forested reservations covered by FMP	6	19	86
Total Category 3,4, & 5 forested reservations	**47**	**92**	**200**

Recommendations

- Better inventory data are needed to build better planning models. The BIA's current CFI system is a low-cost approach to providing the minimal amount of information needed to support basic timber management planning tasks. Allotments and woodlands require special attention.

- BIA should provide more technical support for forest planning. Forest planning requires a working knowledge of all fields of forestry (inventory, biometrics, management, economics, policy, regulation, etc.), wildlife and fishery biology, hydrology, range management, ecological processes, and cultural values, and is typically performed only periodically. As a result, tribal forestry organizations often do not have a forest planning specialist on staff.

- Forest plans should consider and address climate change. None of the forest plans we reviewed addressed climate change.

- Forest plans should consider current and future manufacturing infrastructure.

- For tribes that are moving in the direction of self-determination and self-governance, an IRMP-type document could also serve as the trust agreement between the tribe and Secretary.

NIFRMA Task G

An evaluation of the feasibility and desirability of establishing minimum standards against which the adequacy of forestry programs of the Bureau of Indian Affairs in fulfilling its trust responsibility to Indian tribes can be measured.

NIFRMA addresses state-of-the-art forestry but does not define it. Developing standards is crucial for assessing how well the Secretary of the Interior is fulfilling the duty to support state-of-the-art forestry. A state-of-the-art Indian forestry program must 1) be assured of predictable, consistent, and adequate funding for forestry programs on all reservations, whether direct service, contracting, or self-governance compacting; 2) have access to adequate technical and research support; 3) be guided by each tribe's vision for its forests; and 4) strive to sustain tribal resources and objectives**.** The condition of the forest itself, over time, is the best measure of whether state-of-the-art management is being achieved. A central part of the trust responsibility to see that each tribe has the means to develop its vision and management plans with adequate technical resources and personnel.

Adopting IFMAT-I's recommendation to define the standard as compliance with a forest management plan or IRMP based on the tribal vision for its forest will require that tribal councils be fully engaged in the process. We found tribal council engagement in forestry to vary, ranging from intense to much less so.

Tribal forestry programs, guided by self-determination policies, are increasingly focused on provision of environmental and cultural values that are important to tribes. Tribal values subordinate but not displace market returns from timber as priorities for forest management. Comparisons of tribal programs with those of other landowners with different management objectives may serve to understate the unique combination of benefits provided by investments in tribal stewardship.

Agencies such as the Forest Service and the Natural Resources Conservation Service (both in the U.S. Department of Agriculture) are engaging increasingly with tribes. For example, we observed woodland management activities supported mainly by NRCS. Project partnerships like these can be beneficial, but such engagement is not always coordinated with tribal objectives. The trust obligations of non-BIA agencies to tribes remain ambiguous. The trust duty could be clarified through adoption of interagency agreements with the BIA. There appears to be inconsistent understanding of tribal status and trust responsibility within the host of federal agencies that work with or manage lands adjacent to tribes.

Recommendations

- Adopt IFMAT-I's recommendation to define the standard as compliance with a forest management plan or IRMP that is based on the tribal vision for its forest, subject to approval and signature of the Secretary of the Interior.
- Establish standards for funding Indian forestry that recognize the special ecological, social, and economic importance of Indian forests.
- Consistent with IFMAT-I and II, create an independent trust oversight body; for example, a permanent commission independent of both the BIA and the Secretary, to evaluate the overall federal government's fulfillment of its trust duties to Indian tribes.
- Adopt interagency agreements between BIA and other federal agencies to coordinate deliveries of funding and technical support to tribes, common understanding of shared trust responsibilities, and to increase TFPA activities on federal lands.

NIFRMA Task H

A recommendation of any reforms and increased funding levels necessary to bring Indian forest land management programs to a state-of-the-art condition.

The trust oversight recommendations of both previous IFMATs should be further developed and implemented before the next IFMAT review. When third party oversight is augmented by signed agreements between tribes and the DOI, based upon agreed obligations for both parties created through the planning process, the role of BIA can evolve out of the umpire/pitcher impasse toward that of technical service provider and facilitator of communication between Indian tribes and the federal government.

Increase Indian forestry funding by a minimum of $112.7 million per year. Increase annual base level funding by $100 million to $254 million—the amount we estimate necessary for a level of forest stewardship and timber production that would be consistent with Indian goals. Appropriate $12.7 million to support education and professional training. A system of base and incremental funding should be implemented.

Increase staffing by 792 professional and technical forestry positions. An education coordinator will also be needed to oversee education and professional training as envisioned by NIFRMA. Staffing replacement procedures need to be reviewed so that funded positions can be filled promptly according to a recruiting and retention strategic plan. Adequate compensation and relocation programs must be available.

The anchor forest concept should be supported and expanded. Innovative tribal forest resource management techniques should be considered for appropriate portions of the federal forest estate. Benefit cost analysis of the unique leverages generated by Indian forestry is needed. We hypothesize that collaborative agreements such as anchor forests, TFPA, and stewardship contracting will result in valuable market and ecosystem benefits that more than compensate for investment.

Yakama. Photo by Larry Mason.

Mescalero Apache. Sawmill. Photo by Larry Mason.

The full implications of organizational and personnel changes within the BIA and the federal establishment should be examined for their potential and immediate effects on trust responsibility and the sustainability of Indian forests.

Self-governance tribes should be able to develop tribal NEPA procedures and associated code to replace BIA NEPA manuals and handbooks. This approach furthers self-determination and self-governance and would reward tribes for progress in integrated planning.

A specific list of unfunded mandates should be drawn up and recommendations for their alleviation made and implemented.

Control of trespass within tribal boundaries should be reviewed and strengthened.

Tribes should consider a desired-future-conditions based approach to forest planning. We note that a desired future condition is not a static state, but takes into account and makes provision for the dynamics of natural agents of change (fire, insects, disease, storms, and climate change).

A regularly recurring state-of-the-resource report, including a protocol for continuing data acquisition with specific reference to the NIFRMA-mandated questions should be implemented jointly between BIA and tribal organizations such as the Intertribal Timber Council. An IFMAT-type study of the Native peoples of Alaska and their forests is long overdue. Technical support for economic analysis, climate change adaptation, timber and non-timber forest products marketing, habitat and ecosystem enhancement, and forest planning and inventory are severely lacking, undermining self-determination and integrated forest management.

The BIA's mission is to enhance the quality of life, to promote economic opportunity, and to carry out the responsibility to protect and improve the trust assets of American Indians, Indian tribes, and Alaska Natives . . . through the delivery of quality services, maintaining government-to-government relationships within the spirit of self-determination."
—BIA mission statement



Glossary

Adaptive management – The process of implementing policy decisions as scientifically driven management experiments that test predictions and assumptions in management plans and, using the resulting information, improve the plans.

Allotments – Parcels of land held in trust for specific Indian individuals. Originating out of the General Allotment Act of 1887 communally held tribal lands were divided into separate parcels and a parcel was given to each tribal member.

Allottees – Owners of the allotments.

Annual Allowable Cut (AAC) – The timber volume which can be harvested in one year without exceeding annual timber volume growth. AAC can also be reduced by taking into account other harvest constraints based on management goals.

Appraisal – An estimate of the economic value of a stand of timber or piece of land at a particular point in time.

Austrian formula – A means of calculating annual allowable cut based on a formula that considers the current growing stock level, the desired future growing stock level, the number of years over which the forest will be converted from the current level to the future level, and forest growth.

Backlog – The number of acres of forested land that requires additional stocking or thinning to meet management standards.

Bark beetle – Insects of the family *Scolytidae*, some of which attack live trees and live and mine between the bark and wood of the main stem of the tree. Their infestation may lead to the death of the tree.

Basal area – The area of the cross section of a tree stem including the bark, near is base, generally at breast height, or 4.5 feet above the ground.

Biological diversity (biodiversity) – The variety of life forms and processes, including a complexity of species, communities, gene pools, and ecological functions.

Board foot (BF) – Lumber or timber measurement unit. Equivalent to the amount of wood contained in an unfinished board 1 inch thick by 12 inches long by 12 inches wide.

Bureau of Indian Affairs (BIA) – A division of the U.S. Department of the Interior charged with providing federal services to Indians.

Bureau of Land Management (BLM) – A division of the U.S. Department of the Interior.

Canopy – A layer of foliage in a forest stand. This most often refers to the uppermost layer of foliage, but it can be used to describe lower layers in a multi-storied stand.

Carbon sequestration – The capacity of vegetation, soils, and oceans to take in and retain atmospheric carbon. This is important in relation to global climate change because carbon dioxide is a greenhouse gas.

Ceded lands -- This term was first used in the Treaty with the Wyandot, 1789. Since that time, many treaties have referred to land cessions made by tribes to the United States.

Certification – A system by which a third-party auditor assesses how well a forest owner/ manager conforms with a standard set of principles or objectives, such as FSC or SFI.

Clearcut harvest – A timber harvest method in which all trees are removed in a single entry from a designated area, with the exception of wildlife trees or snags.

Commercial timberland – Land classified as forest that contains at least 5% crown cover of commercial timber species which is currently or prospectively capable of bearing merchantable forest products at a high enough value to provide a net benefit to the user.

Commercial thinning – The removal of generally merchantable trees from a stand, usually to encourage growth of

the remaining trees.

Commercial woodland – Land classified as forest that contains less than 5% crown cover of commercial timber species which is currently or prospectively capable of bearing merchantable forest products at a high enough value to provide a net benefit to the user.

Compacting – A mechanism (authorized under P.L. 100-472) by which a tribe can take over management of any or all federal Indian programs with their associated budgets and exercise discretionary power over how the budgets are distributed among the "compacted" programs.

Competitive bidding – A process of conducting a timber sale offering which requires prospective buyers to make bids and allows the seller to select from the offers.

Confederated tribe - A body of separate and different tribes who operate under one form of tribal government upon a reservation or Indian trust land.

Contracting (authorized by 93-638) – Under P.L.93- 638, tribes may contract the operations of all or part of federal Indian programs.

Continuous Forest inventory (CFI) – A system of permanent plots that provide a sampling of both area and tree attributes (growth, mortality, regeneration). The system's purpose is to render a planning inventory for large ownership tracts over long periods of time.

Cooperative agreements – A legal mechanism, (authorized by P.L. 95-313, "Cooperative Forestry Assistance Act"), by which tribes may enter into service contacts with federal agencies for various forestry activities.

Cord – A unit of measure of cut and stacked wood, generally for pulp (128 cubic feet; 4' by 4' by 8'). The BIA uses an approximate equivalent of 2 cords to one thousand board feet.

Crown cover – The degree to which the crowns of trees are nearing general contact with one another. Generally measured as the percentage of the ground surface that would be covered by a downward vertical projection of foliage of tree crowns.

Cultural resources – Those tangible items which relate to the traditional way that Indian peoples interact with their landscape, including medicine, craft and food plants, sacred or special areas, and burial/ archaeological sites.

Cumulative effects – The compounded impact on the environment of actions taken over time. Incrementally these effects appear minor, but collectively result in significant, unintentional environmental change.

Defoliators – Insects that feed on foliage and act to remove some or all of the foliage from a tree, shrub or herb.

Dwarf mistletoe – A parasitic flowering plant, capable of survival only on living conifers. Heavy infections cause reduction in height and diameter growth, and can result in tree mortality.

Ecological health – The state of an ecosystem as measured by the adequacy of processes and functions to maintain the diversity of biotic communities commensurate with those initially found there.

Ecosystem management – A strategy or plan to manage ecosystems to provide for all associated organisms and processes.

Endangered species – Any species of plant or animal defined through the process of the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range.

Endangered Species Act – Legislation passed in 1973 that seeks to protect any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range.

Engineered wood products – Specialized lumber or other manufactured wood products which have been designed for maximum strength or efficiency of utilization.

Enterprise – Wood-processing facilities.

Even-aged forest – A forest stand comprised of trees with less than a 20-year difference in age.

Even-aged management – Manipulation of a forest stand to achieve a condition in which trees have less than a 20-year age difference.

Fee title (Fee Simple Title) - Absolute ownership of a land area unencumbered by any other interest or estate.

Focus group – A group of people assembled to provide advice and opinions about, in this case, tribal forestry.

Forest – An ecosystem with dense and extensive tree cover which contains at least 10% tree crown cover of any size, or formerly having had such tree cover, and currently not developed nor planned for exclusive non-forest use. Roadside, streamside, and shelterbelt strips must have tree crown width of at least 120 feet. Timberland and woodland are forests.

Forest development – Those activities to do with the regeneration of forest vegetation and control of stand composition and growth, e.g., planting or seeding, thinning, brush control, fertilization, pruning.

Forest inventory – A detailed list of various characteristics of all the forested stands of a particular ownership. Characteristics frequently include the number, species, and growth rates of commercial trees.

Forest management deduction (FMD) - A percentage of the gross proceeds from the sale of forest products harvested from Indian land, which is collected by the Secretary pursuant to 25 USC § 413. Forest management deductions are utilized for forest land management activities in accordance with an approved expenditure plan.

Forest Service – A division of the U.S. Department of Agriculture charged with management of the National Forests and other duties.

Forest Stewardship Council (FSC) – An international association consisting of environmental and social groups, the timber trade and the forestry profession, indigenous people's organizations, community forestry groups and forest product certification organizations. See Certification.

Geographic Information System (GIS) – A computer system capable of storing and manipulating spatial (mapped) data.

Genetic diversity – The genetic variety within populations of a species.

Group selection – Harvest of groups of trees ranging in size from a fraction of an acre up to about two acres.

Growth and Yield – Related to the estimate of current, or prediction of future tree sizes, densities, and volumes.

Growth Model – A quantitative simulation based on empirical research, often computer driven, for predicting future growth and yield of trees and stands.

Gypsy Moth - is a moth in the family Erebidae of Eurasian origin. The gypsy moth is one of the most destructive pests of hardwood trees in the eastern United States.

Habitat – The environment of a specific place in which an animal can survive and reproduce.

Habitat diversity – The number of different types of habitat within a given area.

Harvest level – The amount of timber volume that is removed from a forest over a discrete time period, generally a year.

Harvest scheduling - The act of determining the harvesting level under assumptions about the land available for timber production, land productivity, management intensity, and fluctuation in harvest level permitted from period to period.

Hatcheries - A place for hatching fish eggs, usually with the intention of stocking some water body with young fish.

Indian Country - Indian Country is all the land under supervision of the U.S. Government that has been set aside for the use of Indians. This would include Indian reservations as well as other areas under Federal jurisdiction and designated for Indian use.

Infrastructure - The transportation system including roads, trails, and bridges.

Integrated resource management plan (IRMP) - A plan that integrates the goals, objectives and operations of all the natural resource management programs (e.g., forestry, fish, wildlife, range, water and cultural resources). Related to coordinated management plans.

Interdisciplinary teams (IDT) - A group of individuals with different areas of expertise assembled to solve a problem or task. The team is assembled out of recognition that no one scientific discipline is sufficiently broad to ade-

quately analyze the problem and proposed action.

Invasive species – Plant, animal, fungal or viral species not endemic to an ecosystem which aggressively invade or infect native species or habitat. Also referred to as exotic invasive species, or introduced pests and pathogens.

Landscape - A heterogeneous land area with interacting ecosystems that are repeated in similar form throughout.

Large woody debris (also, coarse woody debris) - Pieces of wood larger than 10 feet long and 6 inches in diameter.

Lump-sum sales - A timber sale in which the purchaser buys rights to all the timber in a given stand at a single flat rate regardless of volume and species.

Managed forest - Any forest that is treated with silvicultural practices and/or harvested. Often applied to land that is harvested on a scheduled basis and contributes to an allowable sale quantity.

Market value - The economic value of an item on an open market.

Marking (timber sales) - The process of marking the trees within a timber sale area, which are either to leave or take in a partial harvest.

Merchantable trees, stands or timber - Trees or stands that can be sold for the wood they contain.

Monitoring - The process of collecting information to evaluate if objective and anticipated or assumed results of a management plan are being realized or if implementation is proceeding as planned.

Montreal Process - A working group, established in 1994, eventually developed criteria and indicators for the conservation and sustainable management of temperate and boreal forests.

Multi-aged management - A forest stand that has more than one distinct age class arising from specific disturbance and regeneration events at various times. These stands normally will have multilayered structure.

National Environmental Policy Act (NEPA) - An act passed in 1969 to declare a national policy that encourages productive and enjoyable harmony between humankind and the environment, promotes efforts which will prevent or eliminate damage to the environment and biosphere, stimulate the health and welfare of humanity, enriches the understanding of the ecological systems and natural resources important to the nation, and establishes a Council on Environmental Quality. It also made federal law the process by which federal development activities must be analyzed to assess their potential effects on the environment.

National Historic Preservation Act (NHPA) - An act passed in 1966 that seeks to protect historic properties; Sec. 106 of that act requires every federal agency "take into account" how each of its undertakings could affect historic properties.

Noncommercial timberland - Land classified as forest that contains at least 5% crown cover of commercial timber species which is not currently or prospectively capable of bearing economically viable quantity of merchantable forest products.

Noncommercial woodland - Land classified as forest that contains less than 5% crown cover of commercial timber species which is not currently or prospectively capable of bearing economically viable quantity of merchantable forest products.

Nutrient cycling - Circulation or exchange of elements such as nitrogen and carbon between nonliving and living portions of the environment. Includes mineral and nutrient cycles involving mammals and vegetation.

Partial cutting - Removal of selected trees from a forest stand.

Performance measures – Means of measuring compliance with SFI forest certification standard objectives.

Population - A group of individual organisms of the same species that is capable of interbreeding, and shares a common gene pool. Population density refers to the number of individuals of a species per unit area, population persistence to the capacity of the population to maintain sufficient density to persist, well distributed, over time.

Precommercial thinning - The removal of a portion of the trees in a stand which are less that merchantable size in order to stimulate growth in the remaining trees.

Prescribed fire - A fire burning under specified conditions that will accomplish certain planned objectives. The fire

may result from planned or unplanned ignitions.

Pulpwood - Logs of a size or species that make them more suitable for pulping for paper manufacturing than for use in solid wood products.

Reforestation - The natural or artificial restocking of an area with forest trees; most commonly used in reference to artificial stocking.

Regeneration - The actual seedlings and saplings growing in a stand; or the act of establishing young trees naturally or artificially.

Reservation - "reservation acreage" refers to lands owned or controlled for tribal purposes that includes various types of land status such as allotted lands held in trust by the United States, tribally owned lands either in fee or trust status and privately owned fee lands.

Residual stand - The trees that remain standing after some event or treatment such as selection cutting or thinning.

Restoration - Improving the current conditions of an ecosystem to restore its original functioning and provide for its long-term productivity.

Riparian area - A geographic area containing an aquatic ecosystem and adjacent upland areas that directly affect it.

Root rot - A tree disease that attacks the roots of trees frequently causing individual tree death. Infected trees and stumps may infect others nearby and can create pockets within a stand with no live trees.

Rotation - The planned number of years between regeneration of a forest stand and its final harvest (regeneration cut or harvest). A forest's age at final harvest is referred to as rotation age

Salvage - The removal of dead or diseased trees from forest stands.

Sawlogs - Logs that are suitable for construction grade or better grades of lumber.

Sawtimber - A stand of timber that exhibits size, form and species characteristics that make it suitable for lumber manufacture.

Scaling - The measurement of a log to estimate the sawtimber volume within it.

Second-growth - Relatively young forest that has developed following a disturbance (e.g., cutting, serious fire, or insect attack) of the previous old-growth forest.

Selection harvest - A method of uneven-aged management involving the harvest of single trees from stands (single tree selection) or in groups (group selection) without harvesting the entire stand at any one time.

Self-determination - The ability of a people to pursue their own goals.

Silviculture - The science and the practice of controlling the establishment, composition, and growth of the vegetation of forest stands. It includes the control or production of stand structure such as snags and down logs, and live vegetation.

Silvicultural prescription - A professional plan for controlling the establishment, composition, constitution, and growth of a forest stand.

Site class - The measure of an area's relative capacity for producing timber or other vegetation.

Site index - The measure of forest productivity expressed as the height of the tallest tree in a stand at an index age.

Site preparation - Any action taken in conjunction with a reforestation effort (natural or artificial) to create an environment favorable to tree survival during the first growing season. It includes altering ground cover, soil or microsite conditions, using biological, mechanical, or manual clearing, prescribed burns, herbicides, or a combination of methods.

Site productivity - The ability of a geographic area to produce biomass, as determined by conditions such as soil type, rainfall, and temperature in that area.

Snags - Any standing dead, partially dead, or defective (cull) tree at least 10 inches DBH and at least 6 feet tall. A hard snag is composed primarily of sound wood. A soft snag is composed primarily of wood in advanced stages of decay and deterioration.

Spruce budworm - A defoliator that feeds principally on current year buds and foliage. Sustained heavy infestation causes complete defoliation in 4-5 years. Epidemics cause decreased growth, tree deformity, top killing, and ultimate death of the trees over extensive areas of forest. It occurs primarily on Douglas-fir and true firs.

Stand - An aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement, and condition that it is distinguishable from the forest in adjoining areas.

Stand condition - A description of the physical properties of a stand such as crown closure or diameters.

Stand-level inventory - An inventory that collects data on the characteristics of trees within discrete stands. It provides a finer scale than CFI, although it is not a substitute for the permanent plots used to monitor long-term forest change.

Stand structure - The various horizontal and vertical physical elements of a stand of trees.

Stocking - A measure of the proportion of the area actually occupied by trees.

Structural complexity - The degree of variation of horizontal and vertical elements within a forest.

Stumpage - The value of standing timber after deduction of logging and processing costs.

Subsistence - Means of supporting life.

Suppression - The action of extinguishing or confining a fire.

Sustainable Forestry Initiative (SFI) - A third-party certification system devised by the American Forest & Paper Association and administered by an independent board.

Sustainable harvest - A harvest volume that can be maintained through time without decline (harvest is less than or equal to growth).

Sustainability - In the context of Indian forestry, it is herein defined as the ability to attain the tribal Vision on a continuing basis.

Sustained yield - The yield that a forest can produce continuously at a given intensity of management.

Thinning - The removal of some trees from a stand to increase growth and vigor in remaining trees.

Timberland - Land qualifying as forest and containing at least 5% crown cover of commercial timber species.

Timber production - The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use, but not fuelwood.

Timber sale administration - The administration of the timber sale contract including review of contractor operation plans, on-site inspection of harvest operations for conformance with contractual requirements, and post-operation audit for contract compliance.

Timber sale preparation - Those activities relating to preparing a stand of timber for logging, including cruising and appraising the timber; designating sale area boundaries; marking trees; defining skid trail locations; preparing the sales contract and putting the sale out to bid.

Timber stand improvement - Measures such as thinning, pruning, release cutting, prescribed fire, girdling, weeding, or poisoning of unwanted trees aimed at improving growing conditions for the remaining trees.

Transportation system - Network of roads used to manage a land area.

Trust - Pertains to the relationship of the U.S. federal government to Indian tribes and denotes a degree of responsibility on the part of the U.S. government.

Trust land - Any land in collective tribal holding or individual ownership for which the Secretary of the Interior has a continuing trust responsibility to manage in a manner to benefit the respective tribe or individual. The most common example is forested acres on a reservation.

Understory - The trees and other woody plant species growing under the dominant tree canopy.

Uneven-aged management - A combination of actions that simultaneously maintains continuous forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and

group selection.

Unfunded mandate – A federally imposed, legally enforceable duty for which compliance has an economic cost to other levels of government. The Congressional Budget Office monitors such impacts.

Utilization - In reference to timber harvest, the removal of wood biomass (logs) from the forest to the mill. Specifically, it refers to that portion of the tree that is removed as a log.

Variable-density thinning - Forest stand thinning which creates gaps and leaves clumps of trees, thus better emulating natural mortality patterns and improving habitat.

Vertical diversity - The diversity in a stand that results from the complexity of the above-ground structure of the vegetation. The more tiers of vegetation and/or more diverse the species composition, the higher the degree of vertical diversity.

Watershed - The drainage area of a lake or stream.

Watershed restoration - Improving current conditions of watersheds to restore degraded fish habitat and provide long-term protection to aquatic and riparian resources.

Windthrow - A tree or trees uprooted or felled by the wind.

Woodland - Land qualifying as forest and containing less than 5% crown cover of commercial timber species.