CHAPTER 7

Laws, Policies, and Regulations Concerning Nontimber Forest Products

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7.1 Overview

The United States regulatory landscape for managing nontimber forest products (NTFPs) is as complex as the broad spectrum of harvesters, consumers, species, and products that make up this category. This overview briefly highlights some of the important historical foundations of United States natural resource laws and introduces more recent concepts and attitudes to management and resource access that are affecting current approaches toward regulation of NTFPs in the United States, which are discussed in this chapter. For a more in-depth discussion of the evolving relationships between people, policies, and NTFPs in the United States and in the global context, see Emery and McLain (2001), Jones et al. (2002), Laird et al. (2010), and Shackleton et al. (2011).

Regulations and policies that address access, management, extraction, trade, and conservation of nontimber forest products exist at multiple governmental levels in the United States (George et al. 1998, McLain and Jones 2002). The basis for these regulations is found in the U.S. Constitution, which defines the authorities between state, Federal, and tribal governments: States are the chief stewards of the wildlife within their borders (U.S. Constitution, Amend. X); the Federal Government has authority "to regulate commerce with foreign nations, and among the several States, and with the Indian tribes" (U.S. Constitution, Art. 1); and, States must regard United States law and treaties as the "supreme law of the land" (U.S. Constitution, Amend. VI), including those clauses that guarantee access for gathering in traditional territories. These underpinnings influenced the early development of United States natural resource laws, creating legal and administrative frameworks that vary within and between local, state, Federal, and tribal jurisdictions and international obligations. The result is that the overall legal framework for NTFPs is often disjointed and ambiguous, with different levels of laws varying in scope, intent, and interpretation. This is a common occurrence with NTFP law and policy around the world (Antypas et al. 2002, Guldin and Kaiser 2004, Jones et al. 2005, Laird et al. 2011, McLain and Jones 2002, Wynberg and Laird 2007).

With the Federal nexus for national natural resource management grounded in jurisdiction and commerce, early approaches to management and access to plants and fungi were aimed at restricting access to resources based on protected status (e.g., state- or Federal-listed species), preventing the spread of plant diseases or invasive species in certain commodity categories (e.g., food or horticulture), or assessing taxes for interstate or international commerce based on the purpose of the extraction (e.g., subsistence, personal, or commercial) (Bean and Rowland 1997). Thus, many of the legal and administrative frameworks that today impact access to and oversight of NTFPs were not promulgated to manage sustainable *use* of these resources; controlling their harvest led to the tendency for laws and policies to be written in reaction to a real or perceived threat of overharvest (Emery and McLain 2001; Laird et al. 2010, 2011; Peyton 2013).

The scope of the earliest natural resource protection laws focused primarily on animals, which has contributed to a disparity in conservation of plants and fungi that has impacted NTFP management. Reflecting the general tendency to focus on animals, plants and fungi were originally excluded from the statutory definition of "wildlife" under the Endangered Species Act (ESA) and the Lacey Act, both of which were amended to include plants, though these acts still differentiate plants as separate entities from wildlife and fungi are not explicitly included in the legal definition of "plants" under these acts (Davoodian 2015, Dunlap 1989, FWS 2015b). As a result, U.S. laws pertaining to the conservation of plants and fungi have not kept pace with animal conservation laws, and the national infrastructure for funding and research is closely associated with game species and other animals (Bean and Rowland 1997, Gilliam 2007, McMahon 1980, Sparling 2014). Bound by the Constitution to uphold Federal laws, state laws and policies often mirror the national regulatory frameworks and state wildlife laws and enforcement efforts have also tended to focus on animals, especially game species (Bean and Rowland 1997, Blevins and Edwards 2009, George et al. 1998, Stein and Gravuer 2008). Although certain Federal legislation exerts authority over animals on nonfederal lands, only state law defines protections for plant species on nonfederal lands (e.g., state, local) and on private property—even for plant species protected under the ESA (Haig et al. 2006). In 1998, of the 45 States with state-level endangered species legislation, only 15 included plants in the definition of "species." By 2008, an additional 17 states had enacted legislation to cover rare or endangered plants, bringing to 32 the number of

states that include plants under state conservation laws, though these laws are often weaker than those afforded to animals (George et al. 1998, Stein and Gravuer 2008).

Today, the major principles shaping NTFP regulations and policies in the United States stem from the shift to ecosystem-based management on Federal lands that began in the 1990s and recent steps toward more inclusive approaches to conservation that value NTFPs (Antypas et al. 2002, Bean and Rowland 1997, Laird et al. 2011, Sills et al. 2011). Though the early years of ecosystem-based forest management focused mainly on timber species, the principles of sustainable forest management have raised the visibility of other species, including NTFPs, as integral parts of forest ecosystems and the livelihoods and traditions of forest-dependent human communities (Antypas et al. 2002; Jones and Lynch 2002; McLain and Jones 2002). During this time, NTFPs were incorporated into forest policies (Laird et al. 2011) and to distinguish them from existing policies pertaining to timber became one of the only natural resources defined by what they are not: timber (USDA Forest Service 2008). However, the development of sustainable use and access policies is complicated by lack of species-specific biological information to determine sustainable harvest levels for most NTFP species (Alexander et al. 2002, 2011; Crook and Clapp 2002; Emery and McLain 2001; Guldin and Kaiser 2004; Jones et al. 2002; Mallet 2002; Vance et al. 2001; von Hagen et al. 1996).

In addition to ecological data, development of sound policy also requires solid socioeconomic and market data. The supply chain for botanical raw materials is characterized by multiple actors and institutions that operate at multiple levels of society with linkages across multiple policy domains (Folke et al. 2005, Hayes and Persha 2010, Laird et al. 2010). United States-based studies of the socioeconomic, sociocultural, and domestic and international market-drivers provide important background information for policies on access, resource use, and conservation, however these data are patchy and inconsistent, including for species with significant markets (Alexander and Fight 2003, Danielsen and Gilbert 2002, Emery and McLain 2001, Fisher 2002, Goodman 2002, Jones et al. 2002, London 2002, McLain and Jones 2005, Schroeder 2002). A case study of the floral greens industry exemplifies the complex governance systems that have developed for certain NTFPs in the Pacific Northwest and the unintended inequities and potential consequences for unsustainable management resulting from regulations made in the absence of understanding socioecological aspects of this harvest system (box 7.1). It illustrates how regulations meant to reduce unpermitted harvesting on state lands shifted control of harvest access and sale of the plant resources to the hands of a few, large leaseholders, generating little incentive to harvest sustainably and greater motivation to poach on public lands. It underscores the importance of considering other sectors that may not seem directly related to NTFPs, such as laws and policies dealing with water, labor, or agriculture that impact access or harvest of NTFPs (Laird et al. 2010, 2011; Mitchell 2014).

International policy dialogue and developments around sustainable use and environmental justice have ushered in new policies relating to NTFPs (Bélair et al. 2010; CBD 2004; CITES 2014b, 2014f, 2014h, 2014i; Crook and Clapp 2002; Emery and McLain 2001; FAO 1985; ITTO 1992; ITTO/IUCN 2009; Jahnige 2002; Jones and Lynch 2002; MPSG 2012; MPWG 1995; Weigand 2002a, 2002b, 2002c, 2002d, 2002e). These policy processes have led to:

- Greater recognition of the value and importance of NTFPs.
- Health, livelihood, and economic benefits provided by nontimber forest resources.
- An understanding of the valuable role of traditional ecological knowledge in developing systems to sustainably use and manage biodiversity.
- Growing awareness that ecosystem goods and services of standing forests are greater than destructive values.
- Recognition of the merits of community stewardship and community-based conservation of natural resources.
- Increased awareness and commitments to conserve biodiversity and address conservation challenges on a global scale.

The following sections in this chapter describe specific laws and policies that impact the harvest and management of NTFPs in the United States on the Federal, tribal, state, local, and international levels and the authorities and context within which they are administered. These sections also illustrate some of the differences between laws and policies that directly impact NTFPs and those that indirectly impact NTFPs but that can often have a greater impact than NTFP-

BOX 7.1
CASE STUDY: **Floral greens industry in the Pacific Northwest**

Nontimber forest product policies and regulations exist within complex and dynamic socioecological governance systems. These systems are characterized by the presence of multiple actors (e.g., agencies, private firms, and nongovernmental organizations) (Folke et al. 2005); institutions that operate at multiple levels of society (e.g., local, State, national, and international) (Hayes and Persha 2010); and connectivity across multiple policy domains or sectors of society (Laird et al. 2010). The following example from Washington State's floral greens industry illustrates how NTFP regulations made without considering the broader governance context may have unintended ecological or social consequences (Laird et al. 2010).

Washington State's moist coniferous forests have supplied global and domestic markets with a variety of floral greens since the early 1900s. Leafy branches from salal (*Gaultheria shallon*) are the primary product, but western swordfern fronds (*Polystichum munitum*), common beargrass leaves (*Xerophyllum tenax*), California and red huckleberry branches (*Vaccinium ovatum* and *V. parvifolium*), and a variety of evergreen boughs (i.e., noble fir, *Abies procera*; western redcedar, *Thuja plicata*; etc.) are sold as well. State, Federal, and private land managers in western Washington began regulating the floral greens harvest through permit or short-term lease systems during the mid-20th century. Additionally, State law RCW 76.48 requires harvesters to have written permission from landowners when harvesting or transporting special forest products, including floral greens.

Washington's floral greens sector underwent rapid transformation in the 1990s as product and labor markets became increasingly globalized. The price of floral greens dropped as alternative products became available in countries with lower labor and environmental regulation costs. Unable to compete in the new market conditions, numerous small buying companies went out of business. A handful of large buying companies soon dominated the floral greens export market, where most of Washington's floral greens are sold. At the same time, immigration and trade reforms, notably the 1986 Immigration Act and the 1994 North American Free Trade Agreement, created incentives for residents of Mexico to come to the United States and disincentives for Latino immigrants in the United States to return to their home countries. By the late 1990s, Latino immigrants—many of them lacking documentation to be or work in the United States—comprised the majority of the floral greens labor force.

Lower prices paid to pickers, combined with an excess labor supply associated with restructuring of the floral greens sector, resulted in more intensive harvesting of salal in long-established harvest sites, as well as expansion of harvesting into new areas. As harvesting pressure on salal resources increased, public land managers, as well as private landowners and some pickers and buyers, voiced concerns about overharvest. Here, it is interesting to note that, "Foresters have tried unsuccessfully for decades to eliminate salal, which competes with tree seedlings, from the forests of the Pacific Northwest" (McLain and Lynch 2010:283). Nevertheless, in the subsequent debates over how to address perceived overharvesting of salal, floral greens stakeholders framed the problem as a poaching problem. For State-managed lands, the solution the Washington Department of Natural Resources (DNR) offered was to consolidate numerous small leases into a small number of larger leases, which it then auctioned off to the highest bidder. Under the State lease system, leaseholders may transfer harvesting rights to one or more other persons. However, the primary leaseholder remains responsible for any damages incurred from harvesting activities. From the Washington DNR's standpoint, administration and enforcement for a small number of large leases is less costly and more efficient than for a large number of smaller leases.

Although intended to reduce unpermitted harvesting on State lands, the DNR's shift to larger leases had the opposite effect. Few harvesters or small buying companies had the financial wherewithal to compete against the large floral greens buying companies in leasehold auctions. As a result, the large buying companies acquired exclusive access to the most productive salal grounds on State lands. To gain legal access to those sites, harvesters typically had to agree to sell their salal to the company holding the lease, often at lower prices than they could obtain elsewhere. Under such circumstances, harvesters with legal rights to harvest on company-held leaseholds had no incentive to harvest less intensively. Incentives for poaching on State lands increased as harvesters sought to retain flexibility in where they could sell their products.

If policymakers had understood better the socioecological governance system in which floral greens harvesting was embedded at the turn of the 20th century, they might have identified other, potentially more effective, solutions. Some examples include the following:

- Setting aside some highly productive salal grounds where bidding would be restricted to small firms or harvester associations could reduce the power of large buying companies to control access.
- Economic development policies aimed at improving the capacity of small buying companies to compete in the NTFP sector could increase market competition, and potentially improve the terms of trade for pickers.
- Immigration and labor policy reforms could provide Latino harvesters with a stronger bargaining position vis-à-vis the large buying companies.
- Land use policies aimed at reducing the rate of forest conversion to residential or industrial development would help ensure that an adequate supply of floral greens remains available.

specific laws. Section 7.2 describes three Federal laws that are the primary influences, with some indirect consequences, on NTFP governance across our country and explores access and specific regulations and policies of the five largest land management agencies, responsible for managing more than one quarter of the United States land area. Section 7.3 explores policies that are applicable to indigenous and tribal peoples of the United States and U.S. territories, on Federal, state, and local levels. This section briefly examines the indigenous and tribal peoples' reserved rights to gather and manage traditionally and culturally significant plants and fungi, including NTFPs, and the progress and impediments to fully implementing and incorporating these rights into land management policies and practices. Section 7.4 draws upon examples from several states to look at the diversity of state-level laws and policies impacting NTFPs, which depend largely upon the existence, strength, and scope of state plant conservation laws or upon the agencies enforcing them. Section 7.5 considers additional regulations and policies specific to a city, district, or township, with examples drawn from a variety of localities, that often directly address NTFP access and management with a tendency toward protecting (i.e., limiting access to) resources. Section 7.6 focuses on United States participation in five international forums that have afforded opportunities to engage in a wider array of policy discussions related to NTFPs and which have and could continue to strengthen United States efforts to better manage NTFPs for their important ecological, cultural, and economic value.

7.2 Federal Laws and Administrative Dimensions

The Federal Government manages over 635 million acres of land, 28 percent of the 2.27 billion acres of land (Gorte et al. 2012). Four agencies administer 609 million acres of this land: the Forest Service in the U.S. Department of Agriculture (USDA), and the National Park Service (NPS), Bureau of Land Management (BLM), and U.S. Fish and Wildlife Service (FWS) in the U.S. Department of the Interior (DOI) (Gorte et al. 2012). Federal land ownership is concentrated in the western states and Alaska. In addition, the Department of Defense (DoD) administers 25 million acres in military bases, training ranges, and more. Numerous other agencies administer the remaining Federal acreage (DoD 2016, Gorte et al. 2012). A synopsis of the regulations relevant to NTFPs across agencies, and the policies that shape agency policy with respect to NTFPs is provided for these five major Federal landholding agencies.

7.2.1 Regulations and Policies

The statutes with relevance to nontimber forest resources that apply across agencies include the ESA, the Lacey Act, and the National Environmental Policy Act (NEPA) (Antypas et al. 2002, Sparling 2014).

The Endangered Species Act of 1973, as amended, is one of the most successful United States environmental laws for conserving rare species. It may also be the best known and probably one of the most debated laws that influence NTFP regulation, policy, and management (Antypas et al. 2002, Peyton 2013).

Two factors used to determine the listing of species under the ESA are "overutilization for commercial… purposes" and "inadequacy of existing regulations" (ESA 1973). It follows that regulations and policies that ensure sustainable management of such resources should preclude the need to list species that are harvested as nontimber forest products under the ESA because of those two factors. The ESA also provides a mechanism for protecting "critical habitat": the geographical areas occupied by a species, or physical or biological features that are essential for its conservation, and can include the area that may lay outside the species range that may be needed for special protection and species management (ESA Sec.3.5.A.). These requirements could protect ESA-listed species that are the sources of nontimber forest products and their habitat that may be at risk from exploitation by unsustainable harvesting methods, over harvesting, and habitat degradation. We are not aware of any analyses to determine how many ESA-protected species are harvested as NTFPs. The FWS maintains a database of all ESA-listed species (FWS 2017). Two examples of plant species that are harvested as nontimber forest products and are listed as "threatened" under the ESA are: Appalachian spirea (*Spiraea virginiana* Britt), relatives of which are used in horticulture, and is threatened by habitat alteration and invasives; and Price's potato-bean (*Apios priceana* B.L. Rob), the root of which is used for food, and is threatened by cattle grazing, clearcutting, and herbicide applications along highways. The ESA provides a regulatory framework for the conservation of threatened and endangered plants and animals.

Animals and plants are not treated the same under the ESA, as the ESA defines the term "plant" separately from "wildlife" (ESA Sec. 3.C.8; ESA Sec. 3.C.14). This has indirectly influenced NTFPs as United States plant conservation laws and funding mechanisms to support research and conservation have lagged behind those for animals (Bean and Rowland 1997, Blevins and Edwards 2009, Dunlap 1989, FWS 2015b, George et al. 1998, Gilliam 2007, McMahon 1980, Negrón-Ortiz 2014, Sparling 2014, Stein and Gravuer 2008). Moreover, fungi are not explicitly encompassed in the statutory definition of "plants," which "…includes any member of the plant kingdom…". In practice, fungi have been included under the general term "plants" by FWS (Federal Register 1993b), and two species of lichens (an association between fungi and algae) are ESA-listed as "endangered": rock gnome lichen (*Gymnoderma lineare* (A. Evans) Yoshim & Sharp) (Federal Register 1995) and Florida perforate cladonia (*Cladonia perforata* A. Evans) (Federal Register 1993a). However, the exclusion of fungi from the legal definition of plants has been cited as a hindrance to their conservation (Davoodian 2015). In addition, the ESA prohibits the unauthorized removal or take of listed species which means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (ESA Sec. 3.19). However, unlike the case for animals, the ESA only protects listed plant and fungal species on Federal lands, not on private lands (ESA 1973).

The Lacey Act of 1900 was the first legislative effort to protect wildlife against illegal possession, transportation, and trade (both exporting and importing). Initially, it was enacted to curtail the commercial exploitation and transport of animals in the United States in the early twentieth century (Dunlap 1989, Lacey Act of 1900). Amendments to the Lacey Act in 1981 expanded the law to include *plants* that are taken, transported, or sold in violation of any *state* or *Federal* law. Amendments to the 2008 Farm Bill broadened the purview of the Lacey Act to include plants and plant products obtained in violation of *foreign* laws (generally meaning state- or Federal-listed species) (APHIS 2014, Bean and Rowland 1997, FWS 2014c). Thus, the Lacey Act can be applied to plant species that are protected under state law, under the ESA, or under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Here again, the legal definition of "plants" excludes fungi, although the Lacey Act would enforce violations against any legally protected species (such as the aforementioned lichens). The Lacey Act has been successfully used to prosecute violators involving nontimber forest products, such as CITES-listed American ginseng (*Panax quinquefolius*), which is also regulated under state laws (FWS 2014a). The USDA Animal and Plant Health Inspection Service (APHIS) is responsible for enforcing the Lacey Act and dealing with violations pertaining to plants and plant products. Special permits are required to move regulated plants and their products and a product declaration is necessary to transport plants across domestic and international borders. Similarly, FWS oversees the transport of wildlife parts and products, including animals, fish, birds, and their products that may come from United States forests or forests abroad. For further discussion of the Lacey Act prohibitions related to plants, including violations of U.S. law or tribal law and violations of State or foreign laws, see Alexander (2014).

The National Environmental Policy Act of 1969 establishes specific environmental goals and procedures for the protection and maintenance of the environment and identifies how to implement these goals in Federal policy and management (NEPA 1969). NEPA directly affects Federal agency management of nontimber species, including NTFPs, by mandating detailed environmental analyses prior to inception of activities that may impact federally managed lands. For example, the Forest Service routinely conducts environmental assessments (EAs) for timber projects and prescribed burns; this may include assessment of the impacts on the harvest of an individual NTFP and/or the harvest of multiple products. In the case of the Forest Service Willamette National Forest in Oregon, an EA may include the potential impact of allowing harvesters to access burned areas to collect morels or the EA may detail how boughs may be collected after thinning of a noble fir stand. Certain Forest Service ranger districts may also ask to use categorical exclusion documentation and approval for instances where there is no significant impact, such as the "hand gathering of a variety of special forest products (SFPs) within 150 feet of roads open to public access" (USDA Forest Service 2014).

7.2.2 Federal Agencies That Manage Nontimber Forest Products

The Forest Service is a multiple-use agency that protects and manages 154 national forests and 20 grasslands in 44 states and Puerto Rico, encompassing 193 million acres of land. The Forest Service's mission is to sustain

the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations (USDA Forest Service 2015a). The Forest Service has a long-standing history of managing limited-scale NTFP harvest (Brown 1950, McLain and Jones 2005, Shaw 1949, USDA Forest Service 1928).

The Forest Service's authority to develop and administer rules governing NTFP harvesting on national forest lands stems directly from the "use and occupancy" and "protection" provisions of the Organic Administration Act of 1897 (McLain and Jones 2005). The Organic Administration Act initiated management of the national forests and directed that forests be established to "improve and protect the resources, to secure water, and to furnish a continuous supply of timber" (Chamberlain et al. 2002). Additionally, the act authorizes the Secretary of Agriculture to protect the forests from destruction (USDA Forest Service 2009).

Other major laws that mandate how the Forest Service manages the natural resources under its jurisdiction include:

- The Multiple-Use Sustained-Yield Act of 1960 recognizes timber as one of five major resources for which national forests are to be managed. This act directs the Secretary of Agriculture to develop and administer the renewable surface resources of national forests for multiple use and sustained yield of the many products and services obtained from these resources (USDA Forest Service 2009).
- The Forest and Rangeland Renewable Resources Planning Act of 1974 (as amended by the NFMA), directs the Secretary of Agriculture to periodically assess the forest and rangeland resources of the Nation and to submit to Congress at regular intervals recommendations for long-range Forest Service programs essential to meet future resource needs (USDA Forest Service 2009).
- The National Forest Management Act of 1976, sets forth the requirements for land and resource management plans for the National Forest System (NFS). It also amends several of the basic acts applicable to timber management. It specifically addresses most aspects of timber management and how it is related to other natural resources. It is the primary authority governing the management and use of natural resources on NFS lands (USDA Forest Service 2009).

In addition, Title 36 of the Code of Federal Regulations (CFR 36)—Parks, Forests, and Public Property— is the principle set of rules and regulations issued by federal agencies of the United States regarding parks, forests, and public property.

In the last 15 years, the Federal Government has taken some action toward managing national forests for NTFPs. The Forest Service refers to NTFPs as special forest products and botanicals, which are defined, in Forest Service Handbook (FSH) 2409.18, Chapter 80 [see section 87.05] (USDA Forest Service 2017). In 2000, Congress directed the Secretary of Agriculture to initiate a pilot program to charge, collect, and retain a "fair market value" fee for the harvesting and selling of forest botanical products (FBPs) (Pilot Program 2000). The Pilot Program Act defines FBPs as "any naturally occurring mushrooms, fungi, flowers, seeds, roots, bark, leaves, and any other vegetation (or portion thereof) that grow on NFS lands." This definition has been further refined in Forest Service policy to include "naturally occurring special forest products, including, but not limited to bark, berries, boughs, bryophytes, bulbs, burls, cones, epiphytes, ferns, fungi (including mushrooms), forbs, grasses, mosses, nuts, pine straw, roots, sedges, seeds, shrubs, transplants, tree sap, and wildflowers." FBPs do not include animals, animal parts, Christmas trees, cull logs, derrick poles, fence material, firewood, house logs, insects, mine props, minerals, non-sawlog material removed in log form, posts and poles, pulpwood, rails, rocks, sawtimber, shingle and shake bolts, small roundwood, soil, telephone poles, water, and worms (FSH 2409.18, chapter 80; USDA Forest Service 2017).

Under the Forest Botanical Products Pilot Program, the permit fees collected should cover at least a portion of the fair market value of the product and a portion of the costs incurred by the Forest Service in administering the Pilot Program. The funds collected may be used on the Forest Service unit where collected, for the costs of conducting inventories of FBPs, determining sustainable levels of harvest, monitoring and assessing the impacts of harvest levels and methods, conducting restoration activities, including any necessary vegetation, and covering the costs of the USDA described in the law (USDA Forest Service 2017). Additionally, the pilot program directs the Forest Service to permit limited free use of FBPs and establish a personal use harvest level for each product, below which no fees would be

charged. The Pilot Program has been reauthorized several times and currently extends through September 30, 2019 (DOI Appropriations 2000, 2004, 2010, 2014).

American Indian tribes, with treaty or other guarantees, retain their rights to gather plant materials and fungi in accordance with the terms of those agreements and subsequent case law. In administering its obligations to Native Peoples of the United States, the Forest Service engages in public processes to refine policies pertaining to access to forest products that have special cultural and traditional significance, including NTFPs (USDA Forest Service 2017). Section 8105 of the Food, Conservation, and Energy Act of 2008 (also known as the Farm Bill) provides that the Secretary of Agriculture may provide, free of charge to federally recognized Indian tribes, trees, portions of trees, or forest products from NFS lands for traditional and cultural purposes (Cultural and Heritage Cooperation Authority of 2012, Farm Bill 2008). However, section 8105 prohibits Indian tribes from using any of the products provided for commercial purposes (Farm Bill 2008; Cultural and Heritage Cooperation Authority of 2012, Farm Bill 2008). The Forest Service issued an Interim Directive providing short-term direction regarding tribal requests for forest products for traditional and cultural purposes (USDA Forest Service 2015b, Federal Register 2014), and published, for public notice and comment, a proposed rule in the Federal Register on July 31, 2014 (Federal Register 2014). The final rule was published in the Federal Register on September 26, 2016 (Federal Register 2016), which became effective on October 26, 2016. The Forest Service issued a Final Directive, in the Forest Service Handbook (FSH) 2409.18, Chapter 80 [see section 82.5] regarding tribal requests for forest products for traditional and cultural purposes, which became effective January 7, 2017 (USDA Forest Service 2017).

The Forest Service provides public access to NTFPs primarily through its timber sale regulations and policies on the sale and disposal of National Forest System timber, special forest products, and FBPs (CFR 36, section 223). In general, Forest Officers may sell other forest products under the timber regulations (CFR 36, section 223.1) when it would serve local needs and meet management objectives (USDA Forest Service 2002). Fair market value is estimated and a permit or sale contract is required when product supply is limited, the product has value, the permittee intends to sell the product, or when issuing a permit constitutes a special benefit not generally available to the public (USDA Forest Service 2017, 2015b). Fair market value is determined by appraisal estimates or other approved methods authorized by the Forest Service Chief through issuance of agency directives (CFR 36, section 223.60). Additionally, timber regulations provide for free use of timber and other forest products under conditions as set forth at Title 36 of CFR, sections 223.5–223.11. Furthermore, Title 36 CFR, section 261.6, describes the Secretary of Agriculture's prohibitions associated with sale and disposal of timber and other forest products.

As a result of the Forest Botanical Products Pilot Program, the Forest Service in 2001 developed a national strategy for SFPs that "sets forth Forest Service strategic goals and suggests key actions for managing renewable resources associated with SFPs within the framework of ecosystem management" (USDA Forest Service 2001). Additionally, the 2012 NFS land management planning final rule (CFR 36, section 219), "is designed to ensure that plans provide for the sustainability of ecosystems and resources; meet the need for forest restoration and conservation, watershed protection, and species diversity and conservation; and assist the Agency in providing a sustainable flow of benefits, services, and uses of NFS lands that provide jobs and contribute to the economic and social sustainability of communities" (Federal Register 2012). Rather than rely solely on the timber sale regulations for the sale and disposal of SFPs and FBPs, in 2007 the Forest Service developed a regulation that would govern commercial harvest and sale of SFPs (Title 36 CFR, section 223) and revise the regulations for their limited free use and personal use (CFR 36, section 261.6) (Federal Register 2007, 2008, 2009a, 2009b, 2009c). Additionally, it would establish the Pilot Program for Forest Botanical Products and contain regulations governing their free, personal use (Title 36 CFR section 223, adding subpart H). Though these amendments were originally intended to go into effect January 2009 (Federal Register 2008), the comment period was instead reopened in early 2009 and implementation was delayed twice (Federal Register 2009a and Federal Register 2009b), before being delayed indefinitely citing the need to have more time for the Forest Service to properly respond to the comments and to consider any potential changes to the rule (Federal Register 2009c).

The Bureau of Land Management, part of the U.S. Department of the Interior, is charged with managing approximately 245 million acres of land mostly in

the Western United States and Alaska (BLM 2014). The BLM uses the term "special forest products" and describes the products as "vegetative material found on public lands that can be harvested for recreation, personal use, or as a source of income" (BLM 2015b). The BLM includes in the term grasses, seeds, roots, bark, berries, mosses, greenery (e.g., galax, fern, fronds, salal, and huckleberries), edible mushrooms, tree seedlings, transplants, poles, posts and firewood. The BLM manages SFPs under any of three resource-use categories: incidental, personal, and commercial use. NTFP management, administration, and monitoring on BLM lands often occurs at the district or unit level. District managers and other resource area managers may administer collection permits and conduct inventories, sales of projects, and law enforcement to prevent NTFP theft (Antypas et al. 2002). The BLM typically provides guidelines to the public for appropriate harvesting techniques and may include specific information for restrictions on where and how much of the NTFP may be harvested. They also keep track of common products that are permitted and sold. NTFPs are typically sold by the BLM through negotiated sales, advertised sales, and leases (Alexander 2011, Antypas et al. 2002). Because harvesting for personal consumption may not require a permit on some BLM lands, the available permit data are less than a perfect estimate of actual harvest (Alexander 2011).

The BLM works closely with other Federal agencies, such as the Forest Service, to administer collection permits for NTFPs and to address conservation and restoration needs. BLM chairs the Federal Native Plant Conservation Committee, comprising twelve Federal agencies that collaborate on conservation needs for native plants (including fungi) and their habitats and coordinate implementation of programs to address those needs (BLM 2014). This group is currently developing a national seed strategy to guide development, availability, and use of seed needed for timely and effective restoration (BLM 2015a), and has a standing working group on the sustainable use and conservation of medicinal plants, called the Medicinal Plant Working Group (Heywood and Dulloo 2005).

The National Park Service manages 401 parks encompassing 84.5 million acres of public land in the 50 states and four territories (NPS 2014). The NPS mission is to "preserve unimpaired the natural and cultural resources and values of the national park system," so lands are managed for ecological integrity and non-consumptive recreation (Antypas et al. 2002, NPS 2014). The NPS recognizes the cultural and economic value of plant and fungal species on parklands and the importance of preserving their biodiversity for conservation and restoration of all species native to park ecosystems (NPS 2014). Thus, national parks can serve as refugia for nontimber forest product species and populations.

The sale and commercial use of natural products is prohibited on parklands (Federal Register 1983). Parks may issue written authorization for the public to harvest "certain fruits, berries, or nuts" where specifically authorized by the park unit for personal consumption and for cultural purposes, so long as the consumptive use does "not adversely affect park wildlife, the reproductive potential of a plant species, or otherwise adversely affect park resources" (Federal Register 1983, NPS 2006). Similar to the Forest Service, NPS units are managed with a certain degree of autonomy, giving discretion to park supervisors to decide whether or not permits or fees are required for consumptive harvest of plant resources, where and how much may be gathered, or to restrict possession of natural products altogether (Antypas et al. 2002; CFR 36, section 2.1(c); Federal Register 1983).

Park Service policy requires data collection to assess native plant population trends. In addition to conserving and preventing detrimental effects to ESA-listed species, Park Service policy is to inventory, monitor, and manage species listed by states and local institutions to the extent possible and to work with surrounding landowners to suggest mutually beneficial harvest regulations for populations that range outside of park boundaries (NPS 2006, 2014). Many Parks make this information available through their websites or otherwise provide this information upon request. The NPS maintains the Forest Health Advisory System, which monitors and projects risks to tree species in forest ecosystems (NPS 2017).

Poaching is one of five categories of threats to resources on national park lands (GAO 1996, NPS 2014). Many NTFPs are illegally harvested and removed from Park Service lands, including mushrooms, mosses, slippery elm bark, galax, cacti, and American ginseng (GAO 1996, NPS 2014, Pokladnik 2008). The NPS has increased the level of awareness, prevention, and law enforcement investigative efforts directed toward environmental crimes, including illegal harvest of NTFPs (NPS 2003, 2004, 2014). Significant effort has

been given to protecting certain plant species that are harvested as nontimber forest products on park lands, including the use of dyes to mark American ginseng roots (Bolgiano 2000, Corbin 2002) and inserting microchip identification tags into saguaro cacti (Small 2014, Thornton 2008). NPS does not maintain comprehensive records of poaching information in their parks.

The National Park Service opened a public comment period, in April 2015, on a proposed rule to authorize agreements between the National Park Service and federally recognized Indian tribes to allow the gathering and removal of plants or plant parts (including mushrooms) by designated tribal members for traditional purposes (Federal Register 2015). The agreements would facilitate continuation of tribal cultural traditions on associated lands included within units of the National Park System without a significant adverse impact to park resources and values. The proposed rule respects tribal sovereignty and the government-to-government relationship between the United States and the Tribes, and would provide systemwide consistency to this aspect of National Park Service-Tribal relations. The proposed rule would provide opportunities for tribal youth, the National Park Service, and the public to understand tribal traditions (Federal Register 2015).

The U.S. Fish and Wildlife Service manages more than 150 million acres of public lands, including 562 National Wildlife Refuges and 6 National Monuments, and is the third largest Federal land management agency after the BLM and the Forest Service (Antypas et al. 2002, FWS 2014c). The Service's major landholding is the National Wildlife Refuge System. The Refuge System is administered for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats and includes a suite of habitats ranging from wetlands and prairies to temperate and boreal forests (FWS 2014c). Though NTFPs and species management are not specifically mentioned, several Refuge mandates, authorities, and policies pertain to management and access to nontimber forest product management (Antypas et al. 2002; FWS 2012, 2014b):

- The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) added or consolidated legislation for the refuges in Alaska, requiring comprehensive conservation plans, and providing for subsistence use and other traditional activities (ANILCA 1980).
- The National Wildlife Refuge System Administration Act of 1996, as amended by the Refuge Improvement Act of 1997, has a key aspect that authorizes the Secretary of Interior to "permit the use of any area within the System for any purpose, including but not limited to hunting, fishing, public recreation and accommodations… whenever he determines that such uses are compatible with the major purposes for which such areas were established" (NWRSA 1966).
- Executive Order 12996 of 1996 defines a conservation mission for the Refuge System and four guiding principles, including providing opportunities for appropriate public use; ensuring the maintenance of the biological integrity and environmental health of the System; and cooperating with other Federal and state agencies, tribes, organizations, industry, and the public in the management of refuges (EO 12996).
- The Refuge Planning Policy of 2000 establishes requirements and guidance for refuge planning, as implemented in Part 602 of the FWS Policy Manual, and includes plant species and their habitats in the considerations of target species and issues of interest (FWS 2015b).
- Compatibility Policy of 2000 defines compatible use as "a use of a national wildlife refuge that will not materially interfere with or detract from the fulfillment" of the refuge mission or purposes, and describes responsibilities associated with the mandate to sustain, restore, and enhance wildlife and plants to include protection, research, census, law enforcement, habitat management, propagation, live trapping and transplantation, and regulated taking, as implemented in 603 FW 2 (FWS 2015b).
- Biological Integrity, Diversity, and Environmental Health Policy of 2001 describes how populations are managed to maintain and restore biological integrity, diversity, and environmental health on refuges, as found in 601 FW 3 (FWS 2015b).

The FWS Office of Law Enforcement (OLE) plays a leading role in protecting wild resources in the United States (Blevins and Edwards 2009). Much of the OLE efforts focus on investigating Federal crimes against endangered species and regulating interstate and international trade in species listed in CITES (Blevins and Edwards 2009, FWS 2014c). The OLE purview includes violations of the ESA as well as the Lacey

Act, and requires collaboration across local, state, and Federal jurisdictions and agencies (Wyler and Sheikh 2013). The FWS maintains a team of Federal Wildlife Officers that patrol the 150 million acre Refuge System, and is experiencing an increase in violent crime against persons and a resultant decrease in detection of natural resource crimes (FWS 2014c). Enforcing, investigating, and prosecuting environmental crimes requires coordination among other Federal agencies (e.g., FWS-Office of Law Enforcement, Department of Homeland Security-Customs and Border Patrol, APHIS, and the Department of Justice-Environmental and Natural Resource Division) as well as local, state, and district entities (e.g., state police, sheriff, and the state court system) (Wyler and Sheikh 2013).

The Department of Defense (DoD) manages 25 million acres of public land (DoD 2016). The major legislation concerning natural resource management on DoD lands is the Sikes Act, as amended, directing the Secretary of Defense to carry out conservation and rehabilitation programs on military lands (DoD 2016, USAEC 2015). All DoD components develop mandatory ecosystem-based Integrated Natural Resource Management Plans that address natural resource management in relation to mission requirements and land use activities (DoD 2013, USAEC 2015). DoD's Natural Resources Program has national policies on the management of "forest products," defined as including, *but not limited to* [emphasis added], standing timber/trees, downed trees, and pine straw (DoD 2013), and so would include nontimber forest products.

The DoD generally allows public access on its land, though such access was curtailed or prohibited after the terrorist attacks in 2001 (Emery et al. 2004). DoD policy indicates that forest products "shall not be given away," that marketable products must be appraised at "fair market value," and that "Forest products may be commercially harvested to generate electricity, heat, steam, or for other" uses that are consistent with the mission, laws, and management plans (DoD 2013). Like other agencies, actual fees and harvest requirements are managed at the installation level. Proceeds from forest products sales are remitted to the installation to cover the costs associated with the production and sale of the products. Of any net proceeds, 40 percent is distributed as "State entitlements" for use on county roads or schools. The remaining 60 percent of net proceeds goes to a DoD Forestry Reserve Account general fund to be reallocated for forest-related management activities or equipment (DoD, n.d.; USAEC 2015).

DoD (2013) environmental regulations allow use of lands by American Indians for traditional and subsistence purposes as long as such uses do not compromise department interests and mission. In addition to the national laws, policies, and authorities followed by all Federal agencies DoD has numerous directives, instructions, and policies aimed at implementing procedures for DoD interactions with federally recognized tribes (DoD 2006). Some research has been conducted on military lands to serve as models for assessing ethnobotanical resources (Anderson et al. 1998, 2001; Rush 2012).

7.2.3 Summary of Federal Regulations and Policies

Federal agencies implement national programs, manage lands, and collect data that include or relate to nontimber forest products, and taken together the policies and institutions involved have significant capacity for managing nontimber forest products. However, other bodies of law indirectly impact NTFP management and use, including land tenure and resource rights law, and can create complexity in the regulatory landscape. At the same time, as noted earlier, inconsistencies in local, state, and Federal approaches persist, although efforts exist to coordinate NTFP harvesting and management strategies for selected species across the Nation. Challenges remaining in NTFP regulation at the Federal level include: resolving permit ambiguities; prioritizing and obtaining the resources and data to develop sustainable harvest plans; reconciling chain-of-custody issues for commercial species; poaching; incorporating market and socioeconomic considerations into planning; and a better understanding of the role that tribal and cultural uses of NTFPs play in stewardship of the resource. Raising the visibility of nontimber forest products within the Federal infrastructures and enhancing interagency coordination of natural resource management could greatly improve management and conservation of nontimber forest species.

7.3 Policies Applicable to Indigenous Peoples

Four canons of United States law guarantee access to NTFPs for cultural and material purposes for specified populations, including indigenous peoples: (1) subsistence provisions of the Alaska National Interest Lands Conservation Act of 1998 (rural Alaskans), (2) the Hawai'i State constitution (Native Hawaiians; Article 12 sec. 7), (3) Native Hawaiian Health Care legislation (42 U.S. Code Chapter 122 sec. 11701), and (4) Federal Indian Law, including the Federal Indian trust responsibility (See Seminole Nation v. United States, 1942). The Federal Indian trust responsibility is a "legally enforceable fiduciary obligation on the part of the United States to protect tribal treaty rights, lands, assets, and resources" of federally recognized American Indian and Alaska Native tribes and villages (Bureau of Indian Affairs 2015). The trust responsibility has been reaffirmed through Congressional treaties, Presidential executive orders, judicial rulings, and other legally binding agreements that establish a Federal/tribal government-to-government relationship on par with United States relations with foreign countries (Bean and Rowland 1997, Fisher 2002, George et al. 1998, Goodman 2002, Gross 1981, Sparling 2014). Indigenous peoples of the affiliated territories of American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands (CNMI) are party to other treaties or agreements that provide for unique relationships with the United States Government (Trask 1991). Palau, the Federated States of Micronesia, and the Marshalls are former United Nations trust territories, now sovereign nations, which have signed treaties called "Compacts of Free Association" with the United States ("Freely Associated States"). Multiple international and Federal policies apply to these indigenous groups' access to and utilization of nontimber forest products derived from public, private, and tribal lands within the jurisdiction of the United States (Allen 1989), including conservation of such resources (Schmidt and Peterson 2009). The regulatory and policy interplay at the state-tribal levels is beyond the scope of this report. However, Jones et al. (2002) explores NTFP tenure issues on Federal land and across governmental jurisdictions in chapters by Danielsen and Gilbert (2002), Fisher (2002), Goodman (2002), London (2002), and Schroeder (2002).

7.3.1 National Laws and Authorities

A number of laws and authorities may be particularly germane to U.S. indigenous peoples' access to NTFPs in an era of changing climates. The rights of American Indian, Eskimo, Aleut, and Native Hawaiians to harvest sacred plants is included under the American Indian Religious Freedom Act of 1978 (McLain and Jones 2005). Any NTFPs used for religious purposes would be subject to this authority. Under the National Historic Preservation Act (NHPA) of 1996, the Government is required to consult with any American Indian tribe or Native Hawaiian organization that attaches religious and cultural significance to properties (see section 101(d) (6) (B) of NHPA). Traditional gathering or ceremonial sites or areas (e.g., Traditional Cultural Property districts) in which NTFPs are harvested and/or processed may be covered by this act.

A number of provisions specific to USDA pertain to indigenous peoples' access to NTFPs. The American Indian Agricultural Resources Management Act (1993), pertains to "agricultural products" including crops, livestock, forage and feed, grains, and *other marketable or traditionally used materials*, with the latter applicable to some NTFPs (italics added). Under the act, resource management plans on Indian agricultural lands must "produce increased economic returns, enhance Indian self-determination, promote employment opportunities, and improve the social and economic well-being of Indian and surrounding communities" (Cultural and Heritage Cooperation Authority of 2012, section 3055). The Farm Bill of 2008 (technically known as the Food, Conservation, and Energy Act) gives broad discretion to the Secretary of Agriculture to provide Indian tribes access to forest products in the National Forest System free of charge for traditional and cultural purposes, as long as the products are not used for commercial purposes (Cultural and Heritage Cooperation Authority 2012). In addition, the Forest Service, Sale and Disposal of National Forest System Timber, Special Forest Products and Forest Botanical Products policy "respects treaty and other reserved rights retained by Tribes, and recognizes the importance of traditional and cultural forest products in the daily lives of Indians." The Forest Service also has regulations specific to the use of forest products on national forest lands by American Indian and Alaska Native tribes for traditional and cultural purposes (25 USC 32.3055). Section 8105 of the 2008 Farm Bill

creates an exception to a National Forest Management Act requirement to sell certain forest products. Section 8105 provides the Secretary of Agriculture with discretionary authority to provide trees, portions of trees, or forest products to federally recognized Indian tribes, free of charge, for noncommercial traditional and cultural purposes. Additionally, section 8105 has been codified in the Cultural and Heritage Cooperation Authority. After due process, The Forest Service issued a Final Directive in the Forest Service Handbook (FSH 2409.18, Chapter 80 [see section 82.5]) regarding tribal requests for forest products for traditional and cultural puposes.

Executive Order (EO) 12898 was issued in 1994 to "address environmental justice in minority and low-income populations (EO 12898). This order created an interagency working group on environmental justice and required the development of agencywide environmental justice strategies (US CCR 2003). Section 6-606 of EO 12898, entitled "Native American Programs," requires that each Federal agency responsibility set forth under this order shall apply equally to American Indian programs. In addition, the Department of the Interior, in coordination with this working group, and, after consultation with tribal leaders, shall coordinate steps to be taken pursuant to this order that address federally recognized Indian tribes. In late 1994, the USDA formulated a plan to ensure that environmental justice principles and initiatives were incorporated into Departmental programs, policies, planning, public participation processes, enforcement, and rulemaking (USDA 2012). In the initial years after the EO 12898 was issued, forest plans included an environmental justice analysis as part of Environmental Impact Statements (USDA 1994). By 2000, forest planning guidance specified particular coordination, consultation, and interactions required with American Indian tribes and Alaska Natives, including the consideration of tribal data and resource knowledge (Code of Federal Regulations, Title 36; see section 219.12-18). In its 2012–2014 Environmental Justice Action Plan, USDA references specific activities under way, including consulting and coordinating with tribal governments as set forth in Executive Order 13175 (EO 13175, USDA 2012). The 2010 USDA Consultation Action Plan identifies "Forest Products, Forest Management, and other Forest-Related and Conservation-Related Issues" as topics for issue-specific regional consultations (USDA 2009).

Regulatory mechanisms and policies since the 1990s have provided greater opportunities to employ TEK in land management. For example, the National Indian Forest Resources Management Act of 1990 directed the Secretary of Agriculture to "undertake forest land management activities on Indian forest land, either directly or through contracts, cooperative agreements, or grants under the Indian Self-Determination Act (1975). "Indian forest land" means Indian lands, including commercial and noncommercial timberland and woodland, that are considered chiefly valuable for the production of forest products or to maintain watershed or other land values enhanced by a forest cover, regardless of whether a formal inspection and land classification action have been taken. Land management activities specifically covered by this act include forest product marketing assistance, including evaluation of marketing and development opportunities related to Indian forest products and consultation and advice to tribes, tribal and Indian enterprises on maximization of return on forest products. Under this act, "forest products" include bark, berries, mosses, pinyon nuts, roots, acorns, syrups, wild rice, herbs, and other marketable material. This act led to the formation of the Indian Forest Management Assessment Team, which has since produced three periodic assessments of Indian forest land management in the United States (IFMAT 1993, 2003, 2013). These assessments have shown that Indian forest lands are among their most valuable resources. Of particular interest with regard to NTFPs, the allotment system created in the 1880s to transfer ownership of parcels of land from tribes to individual Indians has contributed to an increasingly fragmented land ownership structure today that "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" (IFMAT 2013).

The Tribal Forest Protection Act of 2004 (TFPA), authorizes the Secretaries of the Interior and Agriculture to enter into an agreement or contract with Indian tribes meeting project selection criteria established in the act to carry out projects on NFS lands to protect Indian forest land, rangeland, or tribal communities when the NFS lands are bordering or adjacent. An Indian tribe may enter into a contract or agreement to achieve land management goals for Federal land that is under the

jurisdiction of the Secretary, bordering or adjacent to the Indian forest land, or on rangeland under the jurisdiction of the Indian tribe. A 2013 analysis of the TFPA, conducted jointly by the Intertribal Timber Council in collaboration with the Forest Service and Bureau of Indian Affairs (BIA), found that it had been underutilized in the time since the passage of the act, with only six of eleven proposals that were accepted having been successfully implemented. Among the findings were that perceptions differed among tribes, the BIA, and Forest Service on implementing the TFPA; Tribes were reticent to enter into agreements due to concerns about the approval process and duration; and funding for the TFPA relied largely on Congressional appropriations because of a decline in value for forest products (ITC 2013).

7.3.2 Native Peoples of Alaska, Hawai'i, and U.S. Territories

Alaska Natives are unique in that many tribes have governments and corporations that have entered into agreements with the United States that reaffirm Alaska Native access to and utilization of resources, including a range of nontimber forest products for traditional, subsistence, and commercial uses. Approximately 52 percent of the land area of Alaska is managed as public lands, and another 124 million acres as state lands (Schroeder 2002). Most Federal lands in Alaska are managed by the BLM (74.7 million acres) followed by FWS (69.4 million acres), NPS (53.8 million acres), Forest Service (21.9 million acres) and DoD (2.2 million acres). The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) establishes that all rural residents be given "reasonable access to subsistence resources on the public lands" (ANILCA 1980). Thus, under ANILCA, subsistence is open to native and nonnative rural residents of Alaska (PEER 2010). Federal and state agencies are also required to undertake research on fish, wildlife, and subsistence use on public lands, including seeking information and data from those engaged in subsistence uses. Federal agencies and the state of Alaska have developed policies and manuals to facilitate collaboration, consultation, and planning to implement programs under this act (AK DNR 2010; Antypas et al. 2002; FWS 2012, 2014b).

Native Hawaiians retain some rights applicable to nontimber forest product use for traditional and cultural purposes under Federal and state authorities and policies. Regulations and policies pertaining to indigenous and tribal peoples of the Pacific Islands and affiliated territories include acts or proclamations that allow the religious or ceremonial take (i.e., harvesting and gathering) of park natural resources, as under the National Park Service's regulations on the "Preservation of natural, cultural, and archeological resources" (36 CFR 2.1(a), (d)). For example, in Volcanoes National Park of Hawai'i, persons of Native Hawaiian ancestry may collect "natural products…in keeping with the traditions that are rooted in the aboriginal religious practices of the Native Hawaiian people" (PEER 2010). In the National Park of American Samoa, "gathering uses shall be permitted in the park for subsistence purposes if such uses are generally prior existing uses…and if such uses are conducted in the traditional manner and by traditional means" (16 U.S.C. 410qq-2). In American Samoa, the national park is unique—the land is not Federal; it is still owned under the traditional, communal, chiefly system, but is about 20 years into a 50-year lease with the National Park Service (Forestry Program 2010). The National Park Service also implements a Park Ethnography Program, which was integrated into Park Service policy through NEPA and the American Indian Religious Freedom Act of 1978 (Crespi 2003). This program has produced a variety of information on cultural uses of Park resources by American Indian, Alaska Native, Pacific Islander, and other indigenous peoples.

In Guam, regulation for access to and use of NTFPs is covered in part under the Endangered Species Act of Guam (2006), which specifies different uses of habitats and resources by the residents of Guam, many of whom are indigenous people. Section 63304, Forestry Program, recognizes that "trees provide materials for carving and for weaving and which are needed to teach these arts to the future generations of Guam." Under this act, "the Department of Agriculture shall be responsible to protect, develop and manage the Territory's public lands in a manner that will conserve the basic soil resources, and at the same time produce continuous yields of water, wood fiber, forage, recreation and wildlife for the use and benefit of the greatest number of people of Guam. The Department shall also endeavor to encourage and assist private land owners to do the same with their land, and establish an urban and community forestry program with village commissioners and civil groups." Licenses are required for cutting, removal or "mutilation" of

live trees on all public lands. Written requests for such licenses are reviewed and granted by the Director of Agriculture, when satisfied "that such cutting or removal will not materially injure the forest resources of Guam." Guamanian law sets aside some land exclusively for Chamorros (indigenous peoples of the Mariana Islands).

The Constitutions of the Territory of American Samoa and CNMI define rights and privileges of indigenous peoples with respect to land ownership (OTA 1987). Palau, the Marshall Islands and the Federated States of Micronesia are eligible for Forest Service financial and technical assistance as if they were domestic states (Cooperative Forestry Assistance Act 1978). The Constitutions and laws of these countries address land tenure and other rights of their own citizens, including indigenous peoples and local land tenure systems.

7.3.3 Summary

American Indians, Alaska Natives, Native Hawaiians, and indigenous and tribal peoples of U.S. territories have different regulations, authorities and policies governing their access to and harvest of nontimber forest products, or more fundamentally, governing the nature of land tenure encompassing such resources. The right to gather has been described as a "reserved property right" (Goodman 2002), and these access rights vary on ceded and reserved territories, across land management agencies, and from state to state (Allen 1989, Bean and Rowland 1997, Danielsen and Gilbert 2002, Fisher 2002, Goodman 2002, IFMAT 2013, London 2002, Schroeder 2002, West 1992). Some American Indian tribes with ceded and reserved lands that span multiple Federal and state jurisdictions have formed Commissions or Corporations to enhance their self-regulatory rights to manage and access natural resources (Danielsen and Gilbert 2002, Fisher 2002, London 2002). Statutes and Executive Orders have laid the groundwork for more inclusive approaches to management and access, and are being built into state and Federal agency policies to facilitate implementation (AK DNR 2010; Antypas et al. 2002; FWS 2012, 2014b; USDA 2009). Assessments of some of these laws and policies related to American Indians, Alaska Natives, and Native Hawaiians have gauged progress and demonstrated successes in engaging Indians and Indian cultural knowledge into forest management (IFMAT 1993, 2003, 2013; ITC 2013). These assessments also highlight areas where more work is needed and provide tangible targets for improvement. Recent management policies also have created mechanisms for wider use of traditional and local ecological knowledge in the management of forested lands, although the lack of contemporary research documenting these practices hampers progress in this area (Charnley et al. 2008).

7.4 State Laws and Administrative Dimensions

State regulations must comply with Federal regulations, but otherwise states may regulate NTFPs at their discretion. It is important to consider how NTFPs are defined under state law to understand the impact and scope on plants that are harvested as NTFPs. While NTFPs are generally understood to be plants, they are often defined more broadly (USDA Forest Service 2008). State policies and regulations vary widely, with some states having no specific policies or regulations governing NTFPs (e.g., Idaho), while other states specifically mention NTFPs (e.g., Arizona, Washington). State laws that impact plant or fungal species that are harvested as NTFPs generally do so in one of four ways: (1) as plants in general, (2) by species, (3) by activity or product, or (4) by habitat. The agencies that oversee NTFPs are as varied as the diversity of policies and regulations.

7.4.1 State Regulatory Agencies

Almost all laws and policies directly related to NTFPs are efforts to conserve or sustainably manage these resources (Laird et al. 2010). Nontimber plant and fungal resources may be managed by a variety of agencies, including the State Departments of Natural Resources, State Forestry Departments, and State Departments of Agriculture. Other agencies, such as State Parks and Recreation Agencies, Fish and Wildlife Agencies, Water Management Districts, may also be involved in implementing policies that impact species that are harvested as nontimber forest products (Mitchell 2014). The number of management agencies involved in NTFP regulation creates a complex set of issues when seeking to coordinate management strategies within and between states. Policies generated from diverse State regulations related directly or indirectly to NTFPs vary for each State. State regulations range from few specific NTFP regulations (Utah) to highly regulated NTFP environments

(Oregon, Washington). Further, regulations may address only one or some NTFPs or encompass all NTFPs categorically. The variability and degree of management is reflected in examples of different State strategies.

State forests are mandated to manage resources for multiple-uses and some states recognize and incorporate NTFPs as a permitted use and as an income producing strategy. With this mandate, states could integrate NTFPs within forest management for multiple-use, sustainability, biodiversity, conservation, enhanced ecosystem functions, restoration, and recreation and tourism. The wide range of NTFPs collected and harvested for personal and/or commercial use makes managing for these products a challenge for states. Some State forests that allow the harvest of NTFPs use a permit system to generate income and/or to track and monitor harvests. For example, Florida issues permits for a variety of forest products. Saw palmetto (*Serenoa repens*) berry harvest permits cost $10 per day per person with no harvest limit (Mitchell 2014), while grunting (worm harvesting) permits are $55 per site per year (FDACS 2016). How each state manages income from NTFP permitting is as variable as the agencies that manage them and the regulations that define them. Some states (e.g., Oregon, Washington) use the revenues from harvest permits to support schools (ODF 2009, WA DNR 2013).

The Oregon Department of Forestry (ODF) has administrative responsibilities for the harvesting of NTFPs from state forest lands. The ODF established different guidelines for personal and commercial use of these products and has designated allowable harvest volumes for the products since 2006. Personal use collection does not require a special permit, and amounts are limited depending on the NTFP, and are regulated per vehicle, not per person. For example, 1 gallon of mushrooms may be harvested for personal use, while 16 grocery bags of common beargrass (*Xerophyllum tenax*), boughs, ferns, and huckleberry can be harvested for personal use as well (ODF 2015a). Commercial NTFP collection requires permits that vary in cost depending on the product. For example, common beargrass permits are based on district policy, which are variable, while huckleberry plants or cuttings will cost $100 per 130 plants, with permit conditions including a $100 minimum, permits of 1 month duration, and available only in $100 increments (ODF 2015b).

In Pennsylvania, the Bureau of Forestry has management responsibilities for NTFPs on state lands. The Bureau is responsible for overseeing the state's moratorium on the permitted harvest of American ginseng from state forests, and permits for NTFPs with potentially critical management issues such as rare clubmoss/princess pine and clubmoss (both *Lycopodium* spp.) and goldenseal (*Hydrastis canadensis*) are judiciously issued by district foresters (Pennsylvania Bureau of Forestry 2003). NTFPs are directly included in the State Forest Resource Management Plan, with emphasis on understanding the issues surrounding NTFPs and developing effective strategies for managing these resources (Pennsylvania Bureau of Forestry 2016). The concern for the sustainability of the target species and impacts on forest health are the primary motivations behind these management plans and determine which species and how much can be harvested from state lands. Recently updated, a notable change in the Pennsylvania State Forest Management Plan was to subsume NTFP management into the chapter on timber management because "we felt that nontimber forest products are not critical enough in State forest management to warrant their own chapter" (Pennsylvania Bureau of Forestry 2015, page 2). The state's goals for NTFP management include: (1) manage harvest of NTFPs through permits; (2) develop mechanisms to determine the sustainability of nontimber forest product consumption at the district level; (3) develop and implement guidelines for harvest restrictions and remedial activities of nontimber forest products; and (4) build and strengthen relationships with partners interested in the conservation of ginseng and other nontimber forest products (Pennsylvania Bureau of Forestry 2016).

Some State Departments of Natural Resources have regulations for the collection of nontimber forest products from State lands. According to the Iowa Department of Natural Resources (DNR), which administers harvesting of certain "plant life" on State parks and recreation areas, unless otherwise posted State parks and recreation areas are open to the harvest of many species that would be considered NTFPs (e.g., mushrooms, berries), and American ginseng, in particular, cannot be harvested from Iowa State parks (IA DNR 2015). The Washington State DNR offers opportunities for personal and commercial harvest of NTFPs on lands managed by that agency. There are harvest limits for personal use consumption of a variety of plant or fungal materials on

State lands. Limits have been established for the personal use harvest of mushrooms, fiddlehead ferns, cones, common beargrass, conks, and firewood (WA DNR 2015). Washington DNR distinguishes between personal and commercial use, with commercial harvest requiring permits issued by DNR. Most funds generated from these permits in Washington go to State educational trusts. Washington defines SFPs within State statutes and further legislates quantities that define personal or commercial use and directs how harvesters may access products (from landowners, permission through permit or not), and further how one may harvest, possess, and transport plants and products (Washington State Legislature 2015).

In Florida, lands managed by the Florida Fish and Wildlife agency do not permit the harvesting of NTFPs, while some State-managed forests in Florida allow harvesting but implementation of the policies varies and is dependent on individual forest management plans and forest managers. While Florida State regulation requires that State forest management plans include income producing activities, NTFPs are not often directly considered. For example, Florida's Wakulla State Forest includes multiple-use potential and income producing activities (i.e., recreation, grazing, rentals, timber sales, and apiaries), but the collection of saw palmetto berries is absent from the plan even though this NTFP is a resource on the forest (Florida Division of Forestry 2005). Meanwhile, Florida's Goethe State Forest Management Plan specifically includes NTFPs as an income producing activity within its goal of sustainable forest management, specifying that these miscellaneous forest products include "palmetto drupes (berries), firewood, pine straw, apiary leases," and more (Florida Division of Forestry 2013). NTFP definitions, policies, and associated regulations vary not only within states and agencies but across all states.

The Utah Division of Forestry, Fire, and State Lands directs people wanting permits to harvest Christmas trees or firewood to the USDA Forest Service or the BLM. The State's Forest Resource Assessment and Strategy Guide (UT DNR 2010) mentions forest products but is not specific about the harvesting or income potential of NTFPs. In Puerto Rico, State wildlife and forestry laws prohibit collecting any plant part on State lands without a collecting permit from the Puerto Rico Department of Natural and Environmental Resources, and these permits are usually allowed for scientific purposes only (Commonwealth of Puerto Rico 1999, 2000; PRDNER 2005).

7.4.2 Regulation of Plants on State Lands

The variability between resource management agencies and their definition and regulation of NTFPs on State public lands creates challenges. Native and protected plant laws are variable by State. Not all states have plant protection laws. As of 2008, 32 states include plants under State conservation laws (George et al. 1998; Stein and Gravuer 2008). Some states have broad native plant protection laws. In Arizona, for example, native plants may not be legally possessed, taken, or transported from the growing site (even on private land) without a permit issued by USDA. Protected plants include highly safeguarded species, salvage-restricted species, export-restricted species, salvage-assessed species, and harvest-restricted species (including cacti and common beargrass). Arizona has laws and official guidelines for the removal and transportation of protected native plants (even if the plants enter Arizona from another state) and all State law enforcement agencies are involved in monitoring the native plant law activities (Arizona Department of Agriculture 2015, McReynolds 2010).

Regulations that impact plant and fungal species that are harvested as nontimber forest products also vary from State to State depending on the product being regulated. Some states regulate certain plants as harvested species whereas other products are regulated as nursery stock. For instance, Connecticut and Arizona have special State listing categories for native plants that are known to be harvested ("species of special concern" and "harvest-restricted species," respectively) (Connecticut Department of Energy and Environmental Protection 2014, McReynolds 2010). In Florida, the rapid growth of the saw palmetto berry industry since 1995 resulted in legislation meant to directly control the wild-harvest of berries. Legislation declared the saw palmetto berry an agricultural crop and protects it from unauthorized harvesting anywhere it is found (Florida State Legislature 1997, Mitchell 2014). The legislation authorizes sanctions against those found harvesting berries without permission from the landowner. A study commissioned by the Florida House of Representatives (2000) found that unauthorized wild-harvesting of berries continued and would likely continue due to the confounding structure of the saw palmetto berry industry. Many commercially harvested

NTFPs are sold for cash to product dealers after collection, and the informal, and often secretive, nature of the NTFP trade is difficult for states (or any level of government) to understand and regulate (Mitchell 2014).

In comparison, some states regulate NTFPs indirectly as live plant materials and nursery stock or based on the purpose of the harvest. These regulations sometimes address transport within and across State lines as well as the licensing of nurseries, wholesalers, and growers (AZ). Many States, such as Washington, differentiate between individuals harvesting for personal and commercial use and regulate the harvest accordingly (Washington State Legislature 2015). Similarly, states must honor indigenous traditional and customary access to resources for subsistence, cultural and religious purposes (ANILCA 1980, Hawai'i Legislative Reference Bureau 2015). How these materials are regulated depends on the context in which these regulations were established and the purpose of the legislation at the time it was enacted. Often, species-specific regulations are enacted due to conservation concerns and the threat of over collection (e.g., American ginseng), but as a result they may be rushed and poorly considered, or may require modification over time as the threats to species diminish (Emery and McLain 2001; Laird et al. 2010, 2011).

Most states that regulate specific species, such as American ginseng, usually have enacted legislation to protect the species. Any State and Tribe wanting to export wild American ginseng must have its program approved by FWS, as the agency charged with implementing CITES in the United States (50 C.F.R. 23.68). Nearly all wild-harvested American ginseng is exported to Asia. Nineteen states and the Menominee Indian Tribe of Wisconsin have American ginseng programs (table 7.1) approved by the FWS to export American ginseng (FWS 2015a). The states and tribe have statutes for American ginseng regarding the harvest, selling, certification of roots, and required recordkeeping and reporting. Most of the States with approved ginseng programs prohibit the harvesting of American ginseng on State land.

7.4.3 Summary of State Regulations

Intra-agency and interagency coordination among resource managers is important to successfully manage NTFPs. States employ botanists, foresters, wildlife biologists, and other experts but their expertise is seldom directed toward coordinated management of NTFPs. Coordination is most often found when a NTFP is listed as rare, endangered, or of special interest on a State or regional level. Increased coordination

Table 7.1—State ginseng regulation websites.

State	Ginseng program
Alabama	http://www.agi.alabama.gov/divisions/plant-protection
Arkansas	http://plantboard.arkansas.gov/PlantIndustry/Pages/LawsRegulations.aspx
Georgia	http://www.georgiawildlife.com/GinsengProgram
Illinois	http://www.dnr.state.il.us/Law3/Ginseng%20Regulations.htm
Indiana	https://secure.in.gov/dnr/naturepreserve/8235.htm
Kentucky	http://www.kyagr.com/marketing/ginseng.html
Maryland	http://mda.maryland.gov/plants-pests/Pages/ginseng_mgmt_program.aspx
Minnesota	http://www.dnr.state.mn.us/forestry/um/index.html
Missouri	http://mdc.mo.gov/discover-nature/outdoor-regulations/american-ginseng-harvest-regulations
New York	http://www.dec.ny.gov/animals/7130.html
North Carolina	http://www.ncagr.gov/plantindustry/plant/plantconserve/ginseng.htm
Ohio	http://wildlife.ohiodnr.gov/licenses-and-permits/specialty-licenses-permits#tabr2
Pennsylvania	http://www.dcnr.state.pa.us/forestry/plants/vulnerableplants/ginseng/index.htm
Tennessee	http://www.tn.gov/environment/natural-areas/ginseng.shtml
Vermont	http://agriculture.vermont.gov/plant_pest/ginseng_certification
Virginia	http://www.vdacs.virginia.gov/plant&pest/ginseng.shtml
West Virginia	http://www.wvforestry.com/ginseng.cfm?menucall=ginseng
Wisconsin	http://dnr.wi.gov/topic/EndangeredResources/Ginseng.html

between State resource managers and private forest owners could enhance management efforts to ensure that NTFPs are managed sustainably, as part of wider biodiversity, species, and ecosystem sustainability.

States generally lack the biological information and harvest data needed to make management decisions about NTFPs (Alexander et al. 2011, Jones et al. 2002, McLain and Jones 2005). Basic ecological descriptions and summaries of NTFPs are needed to construct baseline inventory of species on State lands. States may need assistance identifying what NTFPs occur on public lands and coordination and collaboration is critical when NTFPs cross State boundaries. Data concerning the resilience of plant species to harvest are critical to identify where efforts should begin to preserve most at-risk species.

States also generally lack mechanisms to track the harvest and movement of species across State lines and borders. For example, though saw palmetto berries are one of the most widely harvested commercial NTFPs by volume (AHPA 2012), Florida does not track the international export of this species, nor is there a species-specific Harmonized Tariff Schedule of the United States that would assist in tracking such exports. Identifying and tracking important NTFPs is a critical step toward monitoring trade and consumption and developing plans for the sustainable use of a species. While the regulatory framework that was established for American ginseng is highly coordinated between the states and the Federal Government, this is the only CITES-listed plant species regulated in this manner. For most other native plant species that are harvested as nontimber forest products, a few states have implemented tracking mechanisms within their boundaries (e.g., AZ) (AZ Department of Agriculture 2015, McReynolds 2010). For most other plant and fungal species that are harvested as NTFPs (including some listed species), there are no mechanisms to track their harvest or interstate commerce, or to preclude commercial overexploitation (Stein and Gravuer 2008). Licensing requirements (e.g., for harvesters or dealers) that lack sufficient ability to track the harvest and movement of NTFP resources are inefficient as a management tool. Laws and policies aimed at harvesters that do not fully incorporate why people harvest NTFPs may also have negative impacts on harvesters (Emery and Pierce 2005), as exemplified by the case study about the floral greens industry in the Pacific Northwest (box 7.1).

7.5 Local and Municipal Laws and Administrative Dimensions

At the local level, counties and municipalities are expected to comply with the overarching Federal, tribal, and State regulations previously mentioned in this chapter. Some localities have additional regulations and policies that are specific to a city, district, or township. These regulations may stem from laws that pertain to land conversion of forest to other types of land uses (or vice versa), under which timber and nontimber products are specified. Local laws may also be written to address the removal of NTFPs from county or public parks. Typically, the local regulations that affect NTFP harvest are administered and enforced by land managers, foresters, or law enforcement officials. These individuals may work in different county or city departments such as natural resources, land planning, or parks and recreation. Laws and policies that affect NTFPs at the local level are often detailed in policy documents such as land or forest management plans. Some county natural resource departments may work with their counterparts at the Federal or State level and with nonprofit organizations to assess NTFP use and sustainable management (Jacobson et al. 2005). The Washington state Forest Practices Board is an example of efforts to manage natural resources through formalized collaborations among public and private entities (WA DNR 2017). Contacting the designated local managers or rangers within these departments is a good starting point for obtaining a collection permit or learning more about the sustainable use and harvest of NTFPs, or the impact of a land-conversion project on access and use of NTFPs in their municipality.

7.5.1 Local Rules and Regulations

District and city laws in urban areas tend to have strict regulations and penalties for NTFP harvesting. This is partly because local authorities consider park resources as needing protection, not as resources that could be sustainably collected and used (McLain et al. 2014). Many examples in this section pertain to the regulatory aspects of foraging. Foraging is explored in more detail in chapter 5 and to a lesser extent in chapters 2 and 4.

The East Bay Regional Park District in California manages 65 parks and over 119,000 acres of land

spanning multiple counties in the San Francisco Bay Area (East Bay Regional Parks 2015). Within these district parks, NTFPs are considered to have intrinsic value as part of the ecosystem, being important intrinsic features of the natural landscape, along with other geographical features and wildlife. NTFPs are mentioned under the Park Feature Protection Rules, Plant Section, "No person shall damage, injure, collect or remove any plant or tree or portion thereof, whether living or dead, including but not limited to flowers, mushrooms, bushes, vines, grass, turf, cones and dead wood located on District parklands. In addition, any person who willfully or negligently cuts, destroys, or mutilates vegetation shall be arrested or issued a citation pursuant to Penal Code Section 384a (Section 804, Plants, East Bay Regional Parks Rules 2014)." Noncompliance with these rules is considered a misdemeanor or infraction and is enforced by district park rangers. Permits are not given for foraging, but "special permission (Section 103) may be granted to remove, treat, disturb, or otherwise affect plants or animals or geological, historical, archaeological, or paleontological materials for research, interpretive, educational, or park operational purposes" (Section 807; East Bay Regional Parks 2014).

The City of Boston, MA, oversees 1,100 acres of land divided into a series of parks, wooded corridors, and waterways and green spaces referred to as Boston's Emerald Necklace (City of Boston 2014a). The city does not allow the removal of plants, and interestingly, plants are cited together with rules about property defacement: "No person shall, in any public park (including any boundary road thereof), or other public place (including any parkway) under the control of the Parks and Recreation Commission, except under the auspices of public authority… (e) dig up, cut, break, remove, deface, defile, or take any tree, bush, plant, turf, rock, gravel, building, structure, fence, railing, sign or other thing connected with such park of place (Section 2; City of Boston 2014b). The regulatory language does not specify other types of NTFPs such as mushrooms, moss, lichens, or downed wood, and it is unclear if these products are included under this rule. Violators may be fined up to $50 for each offense (City of Boston Park 2014b, Section 10).

In New York City, the Administrative Code prohibits "destruction or abuse of trees, plants, flowers, shrubs and grass." Furthermore, "no person shall deface, write upon, sever, mutilate, kill or remove from the ground any plants, flowers, shrubs or other vegetation under the jurisdiction of the Department without permission of the Commissioner" (NYC Parks Administrative Code 2014). Although the city acknowledges the importance of recreationists' values and interest in NTFPs, the city does not offer special permissions or permits for collection. "While we recognize that some patrons do forage within New York City parkland, officially such activity is illegal and not condoned by the agency. Documented, repeated instances of foraging on parkland are subject to prosecution" (Foderaro 2011; NYC Parks Administrative Code 2014).

In the case of Portland, OR, the city considers removal of plant or fungal material from city parks as vandalism, under the "protection of park property" rules. However, Portland allows permitted harvesting. "No person shall remove, destroy, break, injure, mutilate, or deface in any way in any Park any tree, shrub, fern, plant, flower, or other vegetation without a permit from the Forester under the provisions of Chapter 20.40" (City of Portland 2014). Recently, Seattle and Philadelphia have acknowledged the importance of urban foraging. Seattle has included foraging as a legitimate use in its urban forest stewardship plan (City of Seattle 2013). Philadelphia encourages people to pick fruit from trees in public green spaces as part of its revitalization efforts (McLain et al. 2014).

In rural areas, land-planning regulations can affect access and harvest of NTFPs on forested lands. For example, counties may strive to engage in sustainable forestry practices that enhance the landscape, which may indirectly affect nontimber forest product harvesting activities. In Pierce County, Washington, land conversion from forest to other land-use types falls under local land development regulations (Pierce County, Washington 2014). The vast majority of land in this county is considered, "non-conversion" or forested land where timber extraction and human-assisted reforestation can occur. In these forests, Christmas trees and potentially other NTFPs may be harvested. Both timber and NTFP activities on local lands are therefore primarily regulated through the Washington State DNR, while specific regulations for forest land (conversion and non-conversion) are detailed at the county level. Certain NTFP activities do not require formal approval: "Class I forest practices that result in the cutting and/or removal of less than 5,000 board feet of timber for personal use (e.g., firewood and fence posts) in any 12-month period, the cutting and/or removal of Diseased, Danger, and/or Hazard trees as defined in Chapter 18.25 of Title 18

PCC, Development Regulations—General Provisions, the culture and harvest of Christmas trees and seedlings, and/or emergency fire control or suppression shall not be required to obtain any forest practices approval from Pierce County (18H.20.040 Class I Forest Practices, Section A)" (Pierce, Washington 2014).

7.5.2 Local Administrative Dimensions, Policy, and Management

Different departments and officials at the county and city level typically administer all aspects of NTFP management. These include Land Planning Departments; Forestry, Parks and Recreation Departments; and/or Law Enforcement Offices. Tasks and responsibilities may include determining which NTFPs are present in their jurisdiction, developing rules and regulations for NTFPs, and enforcing these rules, often through a permitting system when appropriate and allowed. For example, in Lewis County, Washington, the sheriff's office administers permits for harvesting cedar bark, huckleberries, mushrooms, and other NTFPs (Lewis County, Washington, n.d.).

Policy documents such as land-management and forest plans can directly affect the management of NTFPs at the county level. The land-management plan for Itasca County, Minnesota, addresses the harvest of nontimber resources (Itasca County 2010). The plan details the permitting system for collecting commonly used products such as balsam boughs and fuelwood or other products such as tree-bark, maple sap, Christmas trees, cones, and moss. Clubmoss (*Lycopodium* spp.), for instance, is designated for "personal use" as opposed to "commercial harvesting" to control for and minimize the amount of moss taken from local forests (Itasca County 2009).

Itasca, Beltrami, and St. Louis Counties in Minnesota partnered with other governmental agencies and organizations to create "Guidelines for Sustainable Harvest of Balsam Boughs" (Balsam Bough Partnership, n.d.). These guidelines are designed to inform resource managers as well as commercial harvesters on good practices. In another collaborative effort, Minnesota county, State, and Federal managers contributed toward a market study of balsam fir boughs (Jacobson et al. 2005). The study combined field observational data together with bough buyer and wreath producer market survey results to report where and how much of the resource is used at the county level as well as statewide harvesting amounts. Such studies can serve as a template for other counties and states that are interested in quantifying NTFP occurrence and managing the sustainable harvest of NTFPs at local and regional scales (Jacobson et al. 2005). State universities can play a role in providing information to harvesters or county foresters in the form of workshops or handbooks that may be useful for managing plant species that are harvested nontimber forest products (University of Minnesota Extension 2013).

7.5.3 Summary

Local laws differ by region, county, or city. The variability in regulation and policy is in part due to the autonomy that local government entities possess allowing them to address the specific needs and issues that surround natural resource use that are unique to their jurisdiction. NTFPs may be listed under different sections of local regulatory codes, sometimes under the park protection provisions or even under vandalism or defacement subsections. Within these codes, NTFPs may be lumped under umbrella categories, such as "plants" to include plant products and fungi, or NTFPs may be explicitly outlined. The penalty for noncompliance can differ between cities and municipalities ranging from misdemeanors to monetary fines. One of the challenges for effective regulation and management of nontimber forest resources is the tension between local governmental entities and their efforts to protect and prevent vandalism of NTFPs while simultaneously allowing park recreationists to harvest NTFPs. Typically, land planning, natural resources, or parks and recreation departments are charged with enforcing regulations and administering permits where foraging is allowed. These departments may write policies, such as land or forest plans, that may detail NTFP use. Finally, local governmental entities can partner with nonprofits and universities to research and in some cases, create sustainability standards and management resources such as harvester handbooks which can aid harvesters to navigate the often complex and sometimes hard-to-find NTFP rules and policies in different localities.

7.6 International Law and Administrative Dimensions

The United States is signatory to several legally binding international treaties and also participates as a non-party or non-binding partner in multi-lateral environmental agreements that impact or could inform policies and regulations for nontimber forest product harvest and management. Different Federal agencies lead United States participation in most of these multilateral environmental agreements, which has increased awareness related to NTFPs more broadly across the United States Government. Years of international policy dialogue has increased our understanding of the developments around sustainable use and environmental justice and their importance in addressing the global challenge to conserve biodiversity. This section summarizes several international agreements, with brief descriptions of the authorizing and implementing legislation. It discusses whether and how nontimber forest resources and products are explicitly or implicitly considered in these international agreements. Also, the section identifies how the agreements contribute to sustainable use and conservation of such resources within the emerging principles of community-based conservation, the importance of TEK, the value of NTFPs as important biological resources, and the contribution of NTFPs to human health and livelihoods.

7.6.1 International Laws, Policies, and Authorities

The Convention on International Trade in Endangered Species of Wild Fauna and Flora is a treaty with 180 member countries that work together to ensure that international trade in certain plants (including fungi) and animals, and parts and products derived from them, whether live or dead, are legally harvested and are sustainably harvested (CITES 2014k, Department of State [DOS] 1976, FWS 2014a, UN 2014, Wijnstekers 2011). The United States has been a party to CITES since it entered into force in 1975, and the FWS implements the Treaty under Section 8 of the ESA, as amended (DOS 1976, ESA 1973). The CITES preamble acknowledges the ecological, aesthetic, scientific, cultural, recreational, and economic values of wild species (DOS 1976). Parties to CITES have developed guidance on the sustainable use and conservation of certain CITES-listed species, the role of commercial trade in conservation, the importance of livelihoods that are based on the use of natural resources, and the role of traditional medicine and sustainable harvest (CITES 2014b, 2014e, 2014f, 2014h, 2014i, 2014j; CONABIO 2008; Rosser and Haywood 2002). CITES is unique among conservation treaties by providing a mechanism to forbid trade with noncompliant countries (Brack and Gray 2003, Kerr 2007, Wijnstekers 2011). Because non-CITES countries are required to provide CITES-equivalent documentation to trade with CITES parties, this Treaty effectively pertains to every country in the world (Brack and Gray 2003).

Nontimber forest products such as orchids (family: Asteraceae), American ginseng (figure 7.1), goldenseal, aloes (*Aloe* spp.), and cacti are CITES-listed species that are native to the United States and are traded internationally as medicines, waxes, foods, fragrances, and horticultural species (CITES 2014a). In 2002, CITES members officially agreed that fungi were generally considered to be included in the term "flora" when the CITES Convention was initially drafted, such that fungi are also covered by this Treaty (Resolution Conf. 12.11; https://www.cites.org/eng/res/12/12-11R16.php). CITES-listed species are identified in one of three Appendices (I, II, and III), which convey different levels of protection and determine how the Parties apply import and export controls (DOS 1976, FWS 2014a, Sparling 2014). Species are listed in CITES appendixes I and II based on a decision by the Parties, and proposals to list species must include information on distribution, biology, morphology, and population size and trends, as well as uses, sustainable harvest, regulations, and protections, and legal and illegal trade must be documented (CITES 2014c, 2014d). A listing may cover an entire family (e.g., Cactaceae, Orchidaceae) or any lower taxonomic level (e.g., species). Permits for appendix-I and appendix-II species require two key findings to assist in the conservation of the species: (1) Nondetriment finding—a science based risk assessment to determine whether the export of specimens of the particular species will be detrimental to its survival; and (2) Legal acquisition finding—a determination that the specimen(s) was obtained in accordance with national laws for the protection of wildlife from the country which it originates (DOS 1976, FWS 2014a). Because CITES permits must use scientific names, the scientific names of species are formally agreed upon when species are listed (CITES 2014g). A common misunderstanding is that CITES regulates the harvest

Figure 7.1—The roots of American ginseng (*Panax quinquefolius*), harvested from hardwood forests of the eastern United States, are exported predominantly to China. The export has been regulated by the Convention on International Trade in Endangered Species of Wild Fauna and Flora since 1976 when it was listed on Appendix II of the Convention. (Photo credit: Gary Kauffman, U.S. Department of Agriculture, Forest Service.)

of listed species, whereas CITES regulates the export of specimens of listed species (FWS 2014a).

The International Tropical Timber Agreement (ITTA) is an agreement among the governments of 70 tropical timber consumer and producer countries. It entered into force in 1985 and established the International Tropical Timber Organization (ITTO) to cooperate on sustainable and legal harvest of tropical timber (Sands et al. 2012, UN 2014). The ITTA was revised in 1994 and 2006, and now specifically refers to the contribution of nontimber forest products to sustainable forest management (Sands et al. 2012). The United States belongs to ITTO as a consumer country, and the lead Federal agency representing the United States is the Office of the U.S. Trade Representative (ITTO 2006, U.S. International Trade Commission 1991).

Nontimber forest products figure prominently in ITTO, with permanent committees on forest industry and on economics and markets, and guidance documents for conducting forest inventories that include a valuation of present and potential nontimber forest products (ITTO 1992). ITTO has funded a number of projects on sustainable harvest, chain of custody systems, and projects to support local stewardship and conservation of nontimber forest resources (ITTC 2014, ITTO 2014, Ma 2002, Panayotou and Aston 1992). None of these projects have been based in the United States or its territories, despite the more than 1 million acres of tropical forests on Hawai'i, American Samoa, CNMI, Guam, Puerto Rico, and the U.S. Virgin Islands, and an additional nearly 154,000 acres on the Freely Associated States of Palau and the Federated States of Micronesia (Brandeis and Turner 2009; Liu 2007; Weigand 2002a, 2002b, 2002c, 2002d, 2002e).

7.6.2 Nonbinding International Agreements and Collaborations

The Montreal Process, also known as the Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests, was formed in 1994 (MPWG 1995). The 12 member countries include Argentina, Australia, Canada, Chile, China, Japan, Mexico, New Zealand, the Republic of Korea, the Russian Federation, the United States of America, and Uruguay, representing 83 percent of the world's temperate and boreal forests (FAO 2014c). These countries assess progress toward sustainable forest management based on criteria and indicators, several of which pertain to NTFPs (MPWG 1995, 2000, 2009). Note that the Montreal Process uses the term "nontimber forest products" and includes "game" among the products in this category (Alexander et al. 2011). Acknowledging the general lack of quantitative data, the indicators use both qualitative and quantitative information and provide some mechanisms to drive quantitative data gathering (MPWG 1995, 2000; Jones

et al. 2002). The first United States country report was primarily qualitative and included some examination of the numerous plant and fungal species and user groups involved in NTFP harvest (Guldin and Kaiser 2004). The second report provided extensive quantitative data based on harvest permits and contracts issued on Forest Service and BLM lands, generating some of the first national statistics for temperate and boreal forests. The report demonstrated that harvesting NTFPs in the United States is a significant activity. It further illustrated that international trade is a significant driving force for the harvest of these resources in the United States. The report concluded that there is a lack of critical information that policymakers and land managers need to effectively regulate these species, without imposing barriers to subsistence use (Alexander et al. 2011).

The Convention on Biological Diversity (CBD) takes a comprehensive approach to sustainable use and conservation of each Nation's biological resources (Glowka et al. 1994, UN 1992). The Convention entered into force in 1993 and the Secretary-General of the United Nations assumes the functions of Depositary for this Convention (CBD 2014). There are 194 parties to this Convention (CBD 2014); although the United States has not ratified the CBD, it attends all meetings (NOAA 2014), and plays a substantial role in policy deliberations. The objectives of the CBD are the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of benefits derived from the use of genetic resources (Article 1; CBD 2014). As part of its work to promote sustainable use, the right of indigenous peoples, and biodiversity conservation, the CBD addresses the management of nontimber forest resources, emphasizing *in situ* conservation, recognizing the role of indigenous and local communities in conservation (CBD 2001, Glowka et al. 1994). More recently under the Nagoya Protocol, NTFPs have come to receive attention as "biological resources" (CBD 2001, 2004, 2011). CBD's Global Strategy for Plant Conservation is a worldwide initiative to establish outcome-oriented global targets for plant conservation with relevance to NTFPs (CBD 2002, 2010). Several of the 16 targets pertain to NTFPs, such as Target 12: *All wild harvested plant-based products sourced sustainably* (CBD 2010), and United States agencies and nongovernmental organizations (NGOs) collaborate to gauge progress on this Strategy in the United States (BGCI 2006, CITES 2014h, Galbraith and Kennedy 2006, Miller et al. 2013). Here again, it is generally interpreted that fungi are implicitly included in the term "plants" (Plantlife International 2012).

The International Union for the Conservation of Nature (IUCN) focuses on conservation, equitable governance, and addressing the global challenges of climate, food, and development (IUCN 2014). A variety of IUCN activities pertain to nontimber forest resource use and conservation. The IUCN is best known for the Red List of Threatened Species, which assesses the conservation status of species based on science-based criteria (IUCN 2014). "Biological resource use," including gathering and harvesting of plant and fungal resources, is one of the 12 potential categories of threats that can be assigned to species. Many United States governmental and nongovernmental experts belong to IUCN Specialist Groups, a network of nearly 11,000 experts that focus on a range of species and issues (IUCN 2015). The Medicinal Plant Specialist Group (MPSG) was founded in 1994 to increase awareness of conservation threats and to promote sustainable use and conservation of medicinal plants (MPSG 2012). In 2007, this group developed the International Standard for the Sustainable Collection for Medicinal and Aromatic Plants (ISSC-MAP), incorporating principles of sustainability, adaptive resource management, the role of traditional knowledge, and access and benefit sharing (MPSG 2007). The ISSC-MAP has since been incorporated into the FairWild Standard, a third party certification ensuring fair and sustainable trade in wild plant and fungal products (Brinckmann and Hughes 2010). Another initiative, the Bonn Challenge, was established in 2011 to restore 371 million acres of deforested and degraded lands by 2020. Supported by the Global Partnership on Forest Landscape Restoration (GPFLR 2013), this voluntary network of governments and international and nongovernmental organizations (NGOs) facilitates information exchange, generates new knowledge and tools, and mobilizes capacity and expertise to address landscape restoration. As partners in this effort, the USDA Forest Service has pledged to restore 15 million ha of forest across the United States by 2020 (Tidwell and Karr-Colque 2012).

The Food and Agriculture Organization of the United Nations (FAO) was established in 1943, as a permanent specialized agency, with more than 180 member countries (FAO 2015). FAO uses the term "non-wood forest products" (NWFPs), and its definition excludes all woody products (e.g., fuelwood, carvings made from wood)

and includes all goods of biological origin, including animals (FAO 1999b). NWFPs figure prominently in FAO's permanent Forestry Committee, which coordinates activities and projects for sustainable use and wise management of NWFP resources to improve income generation, create food security, and address timely issues such as climate change and genetic resources (FAO 2013, 2014a, 2014c; Jones et al. 2002). NWFPs have not figured prominently in United States FAO country reports, however. Absent formal tracking systems, there has been a lack of information to demonstrate the value of nontimber forest products in the United States (Alexander et al. 2011). United States country reports have also excluded information from U.S. territories in the Caribbean, where NTFP diversity and usage are higher, especially for food and healthcare (FAO 1997, 1999a, 2014b; Weigand 2002e). There is also a broad international view of the United States as a primary consumer, rather than a producer of NTFPs (Jones et al. 2002). This is partly due to the general lack of valuation and tracking mechanisms for these commodities (Alexander et al. 2011). In the late 1990s, the FAO Non-Wood Forest Products Program announced what would have been the first FAO North American NTFP workshop. Though the workshop did not take place, it spurred the publication of "Nontimber forest products in the United States" (Jones et al. 2002)—a wide-ranging, contemporary assessment with case studies on a broad range of issues and a strong focus on policy that has served as a basis for further discussion and consideration in the United States and abroad (Alexander and Fight 2003, Laird et al. 2011, White and Danielsen 2002).

The Ramsar Wetlands Convention is an environmental treaty that coordinates voluntary local, national, and international cooperation to conserve and sustainably use wetlands (Matthews 1993, UNESCO 1971). The treaty was adopted in 1971 (UNESCO 1971) and currently includes 168 member countries (Ramsar 2014a). The United States joined the Convention in 1987, with the FWS as the technical and scientific lead (Gardner and Connolly 2007). Under this Convention, countries designate "wetlands of international importance" and, though it was promulgated especially for the conservation of waterfowl, Ramsar recognizes the importance of wetlands to food security and for their provision of nontimber forest products (Ramsar 2010, 2012, 2014b; UNESCO 1971). Ramsar recognizes that wetlands may be of substantial value for their role in "supporting human communities by the provision of food, fiber or fuel; maintaining cultural values", and that such use should not undermine the sustainability and conservation of the habitat nor change the ecological character of the site (Matthews 1993). Guidelines on "wise use" of wetlands emphasize developing management plans and programs to inventory, monitor, and research at wetland sites (Ramsar 2010). Efforts have focused on conservation of wetlands for sustainable agricultural development (FAO SAFR 1998) and, more recently, on understanding the costs and benefits of changes to wetland ecosystems, such as salinization and inundation (Ramsar 2010, Russi, et al. 2013).

United States wetlands are the source of familiar plant products such as wild and cultivated foods (e.g., rice, cranberries), floral greens (e.g., peat moss), fiber (e.g., cattails, rushes), and ornamental plants (e.g., Venus flytrap [*Dionaea muscipula*]) (Alvarez 2007, Porter 1990, Ramsar 2014b, Smith et al. 2007). Of the more than 110 million acres of wetlands in the conterminous United States (Dahl 2011), 95 percent are freshwater and include bogs, swamps, fens, marshes, and wet meadows (Alvarez 2007, FGDC 2013). Half of the freshwater wetlands are classified as "forested wetlands," which lost nearly 393,000 acres, mainly from conversion to agriculture, development, and silvicultural treatments between 2004 and 2009 (Alvarez 2007, Dahl 2011, FGDC 2013). To date, 36 sites in the United States have been designated under Ramsar, including sites in Alaska and Hawai'i. However no sites have been designated in the U.S. territories (Ramsar 2014a). Ramsar designation in the United States has increased the visibility of the wetlands, opened new funding opportunities, and has resulted in increased research and ecotourism (Gardner and Connolly 2007).

7.6.3 Summary

Prior to the 1980s, NTFPs did not figure prominently on the international forestry policy agenda. However, in recent decades, policies and regulations concerning the management of NTFPs have emerged in the international arena and grown in importance at home. These settings provide a global context for discussion and an opportunity to address the difficulties faced by many countries in shaping policies that balance sustainable use and conservation of these natural resources, alongside ensuring benefits for harvesters, producers,

and knowledge-holders. In the international arena, the United States generally has been perceived as a consumer of others' NTFPs, and the United States has contributed to this perception, likely due to a lack of information and awareness of the many economically and culturally significant NTFPs found here. U.S. Government participation in these international networks provides opportunities for a broader Federal understanding of the conservation and management of NTFPs, and their importance and value as a forest product. National assessments and reports carried out to meet international obligations are becoming more comprehensive and increasingly underscore the importance of NTFPs to the U.S. economy, livelihoods, and culture. However, the use of this information to effect change in U.S. regulations and policies on a national scale has been slow. Factors that contribute to this are the number of State and Federal agencies involved; the range and complexity of NTFP management; and the compartmentalization of agency roles, responsibilities, and influence on available resources.

7.7 Nontimber Forest Products and Climate Change Policy

This section explores climate change policy pertaining to NTFP management, and the extent that policies and tools could be used to inform NTFP management in the face of climate change. It is not possible to review all climate change policies relative to NTFPs in this synthesis. Notably omitted from this section, but having bearing on NTFPs, are policy research, strategies relative to food systems, and changing land-use pressures. The section only briefly touches upon ecosystem-level impacts and sociocultural-economic considerations.

There is little in the way of U.S. climate change policy that explicitly pertains to NTFPs as a natural resource or commodity category. There are a few examples of nontimber forest products being considered in regional or State-level climate change assessments. Janowiak et al. (2014) and Handler et al. (2014), respectively concluded that climate change will have implications for nontimber forest products in the Great Lakes region and the Laurentian Mixed Forest Province due to changes in temperature, hydrology, and species assemblages. NTFPs, however, are rarely taken into consideration in national climate change research and discussions, and often are not represented in policies.

This is likely correlated with the dearth of actions in U.S. natural resource policies specific to managing, conserving, or protecting native flora that are harvested for economic, cultural, and personal uses. Although the late twentieth century shift to ecosystem-based management on Federal lands has led to the incorporation of NTFPs into forest policies and has raised the visibility of NTFP species as integral parts of forest ecosystems and the livelihoods and traditions of forest-dependent human communities (Antypas et al. 2002, Bean and Rowland 1997, Jones and Lynch 2002, Sills et al. 2011), NTFPs have yet to be recognized from a Governmentwide policy perspective as a class of natural resources requiring specific management. Rather, the focus on plants in U.S. natural resource policy has emphasized invasive species eradication, sustained timber yields, or threatened and endangered species conservation (Antypas et al. 2002, Bean and Rowland 1997, Jones and Lynch 2002, Laird et al. 2011, McLain and Jones 2002, Sills et al. 2011).

Contributing to the dearth of national climate change policies focused on NTFP management is the fact that development of national climate policies as they pertain to natural resource management in the United States is largely a recent phenomenon (Joyce et al. 2006, Lawler et al. 2009, West at al. 2009). Additionally, the accumulation of information to support decisionmaking capacity and the ability of natural resource managers to incorporate new climate concepts into management practices and to incorporate new technologies that take larger scale data into account take time (Staudinger et al. 2013). International policy documents should be viewed as sources of policy considerations that are being undertaken (Laird et al. 2009, 2010).

Nontimber forest products should be included in assessments that outlined in national climate change planning documents that could be applied to NTFP management. A thorough review of the various Federal, State, and Tribal climate adaptation policies and planning documents would be useful to determine the extent that NTFPs are or still need to be included in the considerations.

"Responding to Climate Change in National Forests: A Guidebook for Developing Adaptation Options," a climate analysis and planning guidebook produced by the Pacific Northwest Region of the USDA Forest Service,

provides common sense approaches to climate adaptation planning that could be applied to NTFPs: (1) become aware of basic climate change science and integrate that understanding with knowledge of local resource conditions and issues (review), (2) evaluate sensitivity of specific natural resources to climate change (rank), (3) develop and implement strategic and tactical options for adapting resources to climate change (resolve), and (4) monitor the effectiveness of adaptation options (observe) and adjust management as needed (Peterson et al. 2011).

The report "Strategic Plan for Responding to Accelerating Climate Change" (FWS 2010) provides opportunities to include plant and fungal species that are harvested as NTFPs. The plan embraces landscape-level planning, the use of native plants in restoration, and conservation goals that, for instance, recognize the importance of forest diversity. Importantly, the strategy notes that plants are implicitly included in its use of the term "fish and wildlife," and acknowledges the importance of ecological diversity and social, cultural, and economic benefits of our American ecosystems. Fungi are not explicitly mentioned.

A nationally focused climate strategy that could be particularly relevant to NTFPs is the National Fish, Wildlife, and Plants Climate Adaptation Strategy (NFWPCAP 2012). The strategy was developed with input from a broad array of Federal, State, and Tribal partners, as well as from nongovernment organizations, industry, and private landowners. An implementation working group promotes coordination across sectors to implement the plan. The seven goals and actions are broad enough to encompass NTFPs and could be used to guide more specific considerations for climate change and nontimber forest resources and products.

7.7.1 Sociocultural and Socioeconomic Impacts of Climate Change Relative to Policies and Regulations

Formulating NTFP climate change policy will require a fundamental understanding of the circumstances under which this natural resource functions. As the previous chapters demonstrate, the biological, ecological, social, and economic context of the NTFP sector is complex, but not wholly intangible. Such has been the topic of discussion in the international arena for decades and there is much to learn from this international policy dialogue, as described in section 7.6 of this synthesis. Importantly, several recent publications focused specifically on the U.S. NTFP sector and natural resource management explore approaches to policy development that take these sociocultural and economic nuances into consideration (Alexander et al. 2011; Antypas et al. 2002; Jones and Lynch 2002; Jones et al. 2002, 2005; Peterson et al. 2013). Such information lays the groundwork for incorporating NTFPs into climate change policy.

Few policies and assessments to date address the dependence of forest-based communities on NTFPs and the vulnerability of social, cultural and economic systems regarding NTFPs and climate change. Recent publications describing adaptation options for managing forested ecosystems in the face of climate change illustrate some of these important policy drivers that could impact forested systems, and so too, NTFPs (Joyce et al. 2009; Kemp et al. 2015; Lawlor et al. 2009; Peterson et al. 2011, 2013).

The effects of climate change on American Indians and affiliated indigenous people are not well studied and resource managers, scientists, and the public may not understand which policies or Federal authorities may be applicable (Cordalis and Suagee 2008). In addition, some governmental climate change policies have implications to these indigenous and tribal peoples. Whyte (2014) contends that as climate change policies are developed, they should be understood and tied to existing tribal policies and authorities when and where possible. Of particular concern is the effect of climate change on the spatial distribution of nontimber forest resources and how changes in distribution could affect indigenous peoples' access to traditionally harvested NTFPs.

There are a few examples of Federal policies or authorities pertaining to tribes and climate change. For instance, Section 6 (b) (vi) of Executive Order 13653 (2013) "Preparing the United States for the Impact of Climate Change" includes some guidance concerning tribal issues. Two secretarial orders from the Department of the Interior also provide general guidance for tribes on climate change (DOI Secretarial Orders No. 3285 and 3298). Native Hawaiians and Pacific Islanders of U.S.-affiliated territories may have other local authorities. Other regulations, policies, and guidance pertaining to tribal consultation, land management planning, and natural resource protection could also be interpreted to include climate change (e.g., Executive Order 13175 [2000], USDA 2012, National Indian Forest Resources Management Act of 1990).

Some states have climate policies for some tribes, while others do not. For instance, the 2009 California State Climate Adaptation Strategy specifies that "State agencies will also interact with California Indian Tribes respectfully and on a government-to-government basis. Because traditional knowledge will have a role in combating climate change, indigenous communities should be involved in climate change adaptation actions that will directly impact their people, waterways, cultural resources, or lands; all of which are intimately associated" (California Natural Resources Agency 2009).

7.7.2 Tools That Can Inform Climate Change Policy Pertaining to Nontimber Forest Products

Some climate change tools could be useful for managing plant and fungal species that are harvested as NTFPs. NatureServe developed the Climate Change Vulnerability Index (CCVI) for species; the index integrates projections for temperature and moisture changes with habitat and natural history traits for aquatic or terrestrial plants and fungi within a specified geographic area. The scoring mechanism produces an index of vulnerability using the magnitude of projected climate change to rank each species in a vulnerability category ranging from extremely vulnerable to not vulnerable (Young et al. 2014). The NatureServe database contains entries for many plant and fungal species and includes sections on management, stewardship, threats, and harvest. It is not clear how many of these species have been assessed using the CCVI. NatureServe, with the BLM, has also developed climate change vulnerability indices for major natural community types, called the Habitat Climate Change Vulnerability Index (HCCVI) (Comer et al. 2012). The community-level HCCVIs are useful at regional and national levels, while the species-level assessments of the CCVI provide useful insights for local managers. Conservation and policy decisions can be improved by using this assessment tool (Comer et al. 2012).

The ForWarn—National Resilience Toolkit was developed by the Forest Service and was recently launched as a national climate resilience toolkit (EFETAC, n.d., Workman 2014). This tool is a satellite-based forest disturbance monitoring system, which shows near-real-time changes to vegetation coverage to help detect changes in the landscape (e.g., insects, extreme weather), although it is not clear how informative this tool might be for nontimber forest resources.

Information on the impact of climate change to NTFPs can also be gleaned from national level reports. As discussed in section 7.6, the United States generates national reports in association with international responsibilities that could provide information focused on NTFPs. Examples include the United States country reports under the Montreal Process (Alexander et al. 2011, Guldin and Kaiser 2004) and the FAO State of the Forest reports (FAO 1997, 1999a, 2014b, 2014c).

The Environmental Protection Agency (EPA) compiled decades of data observations from a range of governmental and nongovernmental sources, and recently released its third peer-reviewed report on climate change indicators in the United States. The report uses 30 climate change indicators, including first leaf dates per EPA 2014. The timing of phenological events, such as first leaf dates, is influenced by changes in climate and can indicate sensitivity of ecological processes. Evidence suggests that first leaf dates in lilacs (*Syringa* spp.) and honeysuckle (*Lonicera* spp.) from 1981 to 2010 are happening earlier in the North and West but later in the South. Based on over 90 years of data, the cherry blossoms in Washington, D.C., reach their peak nearly a week earlier. Phenological shifts have also been noted in fungal species. Kauserud et al. (2008) reviewed 60 years of phenological records on the autumnal fruiting date of mushrooms in Norway and concluded that since 1980, the average fruiting time has generally been delayed by nearly 13 days coinciding with changes in weather associated with climate change, with differences noted between normally early-fruiting and later-fruiting fungi. Another analysis of fruiting records in southern England over a 55-year period indicated that deciduous mycorrhizal species were fruiting more often and longer in the season than those associated with coniferous woods (Gange et al. 2007).

7.8 Challenges

This section discusses the broad challenges to regulations and policymaking for nontimber forest products. In doing so, we highlight some of the major themes or issues across the sectors explored in the previous sections, including climate change.

7.8.1 Recognition as a Natural Resource

The ultimate challenge to sustainable use and conservation of nontimber forest resources is to recognize that they are important natural resources and to fully integrate them into natural resource policy and management, at local, state, national and international levels. NTFPs are poorly understood relative to timber and other natural resources, and, except where federally mandated, are rarely considered in land management policy. Few regulatory mechanisms are species-specific and most species that occur in multiple jurisdictions are not managed consistently across their range. The species' population status and sustainable harvest levels are unknown for most NTFPs and the effects of market and other socioeconomic pressures are challenging to gauge. Forest management agencies generally do not perceive NTFPs as significant sources of revenues or concern and often lack the necessary botanical, socioeconomic, and market information.

7.8.2 Complexity

The diversity of rules, regulations, laws, legislations, and treaties that affect how NTFPs are understood, addressed, and managed presents a confounding complexity that requires in-depth knowledge. The legal and administrative structures governing NTFPs are often fragmented, not well defined, and vary widely between and within agencies and jurisdictions. Most policies were not created to address sustainable management and conservation of nontimber forest resources directly, but rather, when addressing them, do so as part of multiple-use strategies. In general, regulations pertaining to protected status (e.g., State- or Federal-listed species), commodity type (e.g., food versus horticulture), or the purpose of the extraction (e.g., personal versus commercial) often apply to NTFPs "by default." Existing laws or policies associated with nontimber forest products may not be known or understood by the many Federal, State, and other government agencies, much less by those who seek to access NTFPs.

Adding to the complexity are the many terms, definitions, and perspectives that embrace nontimber forest products. Products that are harvested from forests, other than timber, are referred to by many names. Some of these terms are incorporated into legislation. In 2000, the U.S. Congress directed the Secretary of Agriculture to implement a program to collect fees for the harvest and sale of FBPs. BLM and the Forest Service use the term "special forest products." Other terms used internationally, such as non-wood forest products, may include animals. The integration of these into forest management should be looked at as an opportunity to expand and embrace total ecosystem management.

7.8.3 Diverse Stakeholders within Largely Informal Economies

One of the major challenges in NTFP management is how to incorporate the diversity of stakeholders into facilitated conversations with the goal of considering and accommodating the many views, concerns, and people who are affected by the policies that impact access to these products. Efforts to incorporate all stakeholders into policy dialogue and development are challenged to address intellectual property rights regarding the use of and application of traditional knowledge when developing climate change mitigation and adaptation strategies.

The effects of climate change on NTFPs and indigenous people who benefit from them, and the applicability of Federal policies or authorities to address these impacts are not well understood (Cordalis and Suagee 2008). This challenge can be extended to other stakeholders, as well. Formal, structured processes to access NTFPs may present serious challenges for harvesters who may not have the knowledge of how to apply for permits or cash to pay permit fees. This can leave already vulnerable harvesters at greater risk of being taken advantage of by others or experiencing sanctions for harvesting. For example, many Guam residents depend on trees and related products for construction materials, yet applications can make the permitting process cumbersome. Harvesters may have negative perceptions of involvement and may be distrustful of outside organizations. This is compounded for some harvesters whose citizen status is other than United States.

Special challenges are evident in providing consistent policy to address indigenous people's rights for access to NTFPs. Legal conditions and history complicate the relationship of the Federal Government to American Indians, Alaska Natives, Native Hawaiians, and other indigenous-tribal peoples of the U.S.-affiliated territories for NTFPs, and make planning for the impacts of climate change extremely challenging. Many tribal governments are developing their own regulations for NTFPs and

climate response strategies, and coordination among all governments is a critical challenge that must be overcome to provide more consistency across jurisdictions.

7.8.4 Federal Agencies

Efforts in the United States to consider NTFPs as part of integrated landscape management planning have been highly localized, with little opportunity for sharing and learning. Ashe (2014) points out in discussing the challenges with implementing Ramsar that "the U.S. extends from the subtropics to the Boreal zones and includes continental as well as insular settings, terrestrial and marine domains in the Pacific and Atlantic Oceans. There are 85 distinct ecoregions found within the continental United States alone. Implementing NTFP management strategies requires harmonization of efforts across Federal agencies, State agencies, localities, and NGOs that are responsible or involved in the management of the different types of resources within each of these geographical areas."

United States Federal agencies are adapting to changing environments and developing approaches to assess the sustainability of NTFP harvesting. In an era of declining budgets, Federal agencies are finding ways to collaborate on issues of mutual interest and concern but these collaborations are inconsistent across the country. The suspected magnitude of the harvesting of some highly commercialized NTFPs may be greater than current support can address, and baseline data for commercial NTFPs is critical information needed to address climate change impacts. Regional differences in land ownership, ecology, and culture will require different, adaptive approaches and policies at multiple scales that are consistent and understandable across regions and landscapes. More support for collaboration and cooperation on NTFP research and management can substantively address this challenge.

The Forest Botanical Products Pilot Program that guides how national forests address NTFPs has potential to improve management of these products. It provides a framework for managing nontimber forest resources on public forest lands. Fees collected from the issuance of harvest permits are supposed to reflect fair market value, though there are no national-level instruments to aid in estimating fair market value. Fees collected can be used on the specific units (e.g., national forest, ranger district) whence they originated, but not on other units. This presents a challenge for units that do not have many permitted harvests. Management efforts are thus limited to units that have a great deal of permitted harvesting, though other units may need management efforts. Further, the technical expertise may be lacking to conduct inventories, determine sustainable harvest levels and monitor harvest impacts. More proactive management that integrates nontimber forest resources as objectives, with desired future outcomes, is needed to address the challenge of ensuring sustainable management of these resources.

7.8.5 International Agreements

More is known about American ginseng than any other medicinal forest product because of its listing in appendix II of CITES. The data provided through the ginseng program are invaluable in assuring the sustainable management and conservation of this important forest herb. CITES databases provide international trade data for many NTFP species (e.g., American ginseng, goldenseal, and candelilla [*Euphorbia antisyphilitica* Zucc]) and spur interest from conservation and research institutions to study species (UNEP-WCMC 2014a, 2014b). Further, efforts to circumvent the requirements of CITES present serious challenges to law enforcement. Accurate recordkeeping, as well as the use of proper channels to export ginseng roots is necessary to meet the responsibilities and obligations of the Convention. Although it is possible to obtain trade information for taxa listed in the CITES appendixes, many species, both CITES listed and not listed, do not have taxon-specific International Harmonized Tariff Schedule codes that allow for tracking of trade volumes. This presents a significant challenge in determining harvest and trade volumes, estimating the importance of NTFPs, and ascertaining if international trade is having detrimental impacts on these resources. There are several other international agreements that could enhance efforts to address the challenges of sustainable management of NTFPs, including those faced by climate change.

7.9 Opportunities

There are clear links between rural livelihoods and sustainable ecosystem conservation, and countries worldwide are struggling to ensure that natural resource management strategies allow for continued use of these

natural species, while ensuring the long-term survival and availability of the resources. Recent United States laws and trends in natural resource policy and management are pointing toward more holistic approaches to conservation and sustainable use of NTFPs. Commercialization of NTFPs can enhance economic opportunities without detriment to the environment or culture (Belcher and Schreckenberg 2007). By open communication with all stakeholders, policy interventions can be developed that enhance returns to local collectors and contribute to sustainable management of nontimber forest resources (Green et al. 2000). There are plenty of opportunities to enhance nontimber forest resource management in the United States (Vaughan et al. 2013).

7.9.1 Federal-Private Partnerships

Partnerships for conservation of nontimber forest resources present opportunities to leverage expertise, experience and expenses. For example, NatureServe working with BLM and other entitities conducted a climate change vulnerability assessment of major natural community types (Comer et al. 2012). The project tested an HCCVI that would provide measures of a plant community's sensitivity and resilience to climate-induced stressors. The overall index scores for each community are useful at regional and national levels, while the results of individual analyses provide useful insights for local managers. Conservation and policy decisions will be improved by this forecasting tool (Comer et al. 2012). Similarly appropriate initiatives with industry (e.g., botanicals, horticultural) and Federal management agencies could advance medicinal plant and fungal conservation. Partnering with the National Association of Conservation Districts presents opportunities for education and community service.

7.9.2 Indigenous Peoples

Opportunities exist to improve consistency in how Federal and State agencies address the rights of access and use of nontimber forest resources by indigenous peoples. In particular, regional or territorial approaches to confront the impacts of climate change on nontimber forest resources and harvester groups, and development of applicable policies and guidance will foster sustainable use of these natural resources. The incorporation and respectful use of indigenous knowledge and adaptation strategies for the management of nontimber forest resources and identification of the threats and stressors of climate change to natural resources and the people who depend on them could guide and inform the development of applicable policy and regulations. Additionally, two important points should be addressed. First, more consistent laws and policies for the use of NTFPs by indigenous groups and better respect for traditional knowledge and practices are critical. Second, the impact of climate change on culturally and economically important NTFPs for indigenous peoples should be evaluated, and the role of tribal knowledge in mitigating the effects of climate change, or assisting with adaptation, studied and incorporated into policy formulations.

7.9.3 International Agreements

International agreements to which the United States is party (and those which it is not, like the CBD) provide opportunities to advance the sustainable management and conservation of NTFPs, and their equitable commercialization. For example, there are mechanisms through CITES whereby tracking international trade of NTFPs is possible for listed species. Likewise, Ramsar evaluation guidelines for wetlands may be useful for informing sustainable use and conservation of NTFPs (Ramsar 2010, 2014b). Developing these in the United States would advance NTFP management worldwide. Reports generated in association with United States international responsibilities, such as the United States country reports under the Montreal Process (Alexander et al. 2011, Guldin and Kaiser 2004) and the FAO State of the Forest reports (FAO 1997, 1999a, 2014b, 2014c), may not be widely available or known in the policy realm and could be disseminated more widely amongst policymakers. Additional topics in the international arena that merit further attention include: the role of certification as a nonbinding tool for NTFP management; aspects concerning intellectual property rights and the role of TEK; and nongovernmental contributions that contribute to stewardship and industry norms.

7.10 Key Findings

- The body of laws and regulations governing NTFPs is complex and involves jurisdictions from local to international levels.

- The plethora of laws and regulations that apply to NTFPs generally were not created to address sustainable management and conservation of these important resources.
- The diversity of NTFP stakeholders represents a challenge for their incorporation into policy dialogues.
- Special legal responsibilities and challenges are present when addressing indigenous people's rights of access to NTFPs.

7.11 Conclusions

There are many United States laws and policies influencing access to nontimber forest products and management of these plant and fungal resources. Early domestic law set the conservation of plants and fungi on a different path than that of animals. Subsequent legal and administrative frameworks were founded on the need to prevent the spread of plant or fungal disease and invasive species, to assess taxes for interstate and international commerce, or to protect imperiled species as a means to conservation. Such regulations have tended to restrict access to NTFPs and obscured the focus on factors that influence extraction and impeded development of sustainable use policies. As a natural resource that has been largely invisible to modern-day public land managers, however, these regulations provide some of the few measures of tracking and management that exist for these important plant and fungal species. Recent policy developments have set the stage to manage these species as renewable natural resources. More uniform laws and policies are needed that balance the sustainable use and conservation of NTFPs, especially in the face of climate uncertainty.

7.12 Literature Cited

Alaska Department of Natural Resources (AK DNR). 2010. State ANILCA coordination. Anchorage, AK: Department of Natural Resources. http://dnr.alaska.gov/commis/opmp/anilca/more.htm. [Date accessed: August 9, 2017].

Alaska National Interest Lands Conservation Act (ANILCA). 1980. Public Law 96-487. Washington, DC: Department of the Interior, U.S. Fish and Wildlife Service. 16 C.F.R. 410hh. https://www.fws.gov/laws/lawsdigest/ALASKCN.HTML. [Date accessed: August 10, 2017].

Alexander, K. 2014. The Lacey Act: Protecting the Environment by Restricting Trade. Congresssional Research Service 7-5700. https://fas.org/sgp/crs/misc/R42067.pdf. [Date accessed: August 10, 2017].

Alexander, S.; Fight, R.D. 2003. Managing access to nontimber forest products. Compatible Forest Management. 8: 383–400.

Alexander, S.; Oswalt, S.N.; Emery, M.R. 2011. Nontimber forest products in the US: Montreal Process indicators as measures of current conditions and sustainability. Gen. Tech. Rep. PNW-GTR-851. Portland, OR: U.S. Department of Agriculture, Forest Service, Northwest Research Station. 36 p.

Alexander, S.J.; Weigand, J.; Blatner, K.A. 2002. Nontimber forest product commerce. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber forest products in the United States. Lawrence, KS: University Press of Kansas: 115–150.

Allen, M. 1989. Native American control of tribal natural resource development in the context of the federal trust and tribal self-determination. Boston College Environmental Affairs Law Review. 16(4): 857. http://lawdigitalcommons.bc.edu/ealr/vol16/iss4/6. [Date accessed: August 9, 2017].

Alvarez, M. 2007. The state of America's forests. Bethesda, MD: Society of American Foresters. http://www.nelma.org/wp-content/uploads/StateOfAmericasForests1.pdf. [Date accessed: August 9, 2017].

American Herbal Products Association (AHPA). 2012. Tonnage surveys of select North American wild-harvested plants, 2006–2010. Silver Spring, MD: American Herbal Products Association. 24 p.

American Indian Agricultural Resources Management Act of 1993; 25 U.S.C. 3103(3)

American Indian Religious Freedom Act of 1978; 42 U.S.C. sec. 996, as amended, 16 U.S.C. 1996.

Anderson, A.B.; Ziedler, J.A.; Dendy, J.H.; Moerman, D.E. 1998. Assessing installation ethnobotanical resources using land condition trend analysis (LCTA) data: a Fort Riley, Kansas, case study. USACERL Technical Report 98/92. Champaign, IL: U.S. Army Corps of Engineers.

Anderson, A.B.; Ziedler, J.A.; Dendy, J.A.; Moerman. 2001. A preliminary ethnobotanical survey of Fort Riley, Kansas. Transactions of the Kansas Academy of Science. 104(1): 92–108.

Animal and Plant Health Inspection Service (APHIS). 2014. Illustrative list of taxa (and parts thereof) considered common food crops, and/or common cultivars under the Lacey Act Amendments of 2008: 1–20.

Antypas; A.; McLain; R.J.; Gilden, J. [and others]. 2002. Federal nontimber forest products policy and management. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber forest products in the United States. Lawrence, KS: University Press of Kansas: 347–374.

Arizona Department of Agriculture. 2015. Protected Arizona native plants. https://agriculture.az.gov/protected-arizona-native-plants. [Date accessed: February 26, 2015].

Ashe, D.M. 2014. National report on the implementation of the Ramsar Convention on wetlands-United States. National reports to be submitted to the 12th Meeting of the Conference of the Contracting Parties, Uruguay, 2015. http://www.ramsar.org/sites/default/files/documents/2014/national-reports/COP12/cop12_nr_united_states_america.pdf. [Date accessed: August 9, 2017].

Balsam Bough Partnership. [N.d.]. Guidelines for sustainable harvest of balsam boughs. St. Louis County, MN: Balsam Bough Partnership. https://www.stlouiscountymn.gov/Portals/0/Departments/Land/Timber%20Sales/Sustainable-Harvest-Guidelines.pdf. [Date accessed: February 25, 2015].

Bean, M.J.; Rowland, M.J. 1997. The evolution of wildlife law. Praeger: Greenwood Publishing Group. 544 p.

Bélair, C.; Ichikawa, K.; Wong, B.Y.L.; Mulongoy, K.J., eds. 2010. Sustainable use of biological diversity in socio-ecological production landscapes. Background to the "Satoyama initiative for the benefit of biodiversity and human well-being." Technical Series no. 52. Montreal: Secretariat of the Convention on Biological Diversity. 184 p.

Belcher, F.I.; Schreckenberg, F.I. 2007. Commercialisation of nontimber forest products: a reality check. Development Policy Review. 25(3): 355–377.

Blevins, K.; Edwards, T. 2009. Wildlife crime. In: Miller, J., ed. 21st century criminology: a reference handbook. Thousand Oaks, CA: SAGE Publications: 557–564. http://dx.doi.org/10.4135/9781412971997.n65. [Date accessed: August 9, 2017].

Bolgiano, C. 2000. Gold in the woods. American Forests. Winter: 7–9.

Botanic Gardens Conservation International (BGCI). 2006. North American botanic garden strategy for plant conservation. Surrey, UK: BGCI. http://northamericanplants.org/wp-content/uploads/2016/05/NAGSPC.pdf. [Date accessed: August 10, 2017].

Brack, D.; Gray, K. 2003. Multilateral environmental agreements and the WTO: report September 2003. London: The Royal Institute of International Affairs, Sustainable Development Programme, International Institute for Sustainable Development. 43 p. https://www.chathamhouse.org/sites/files/chathamhouse/public/General/meas_and_wto.pdf. [Date accessed: August 9, 2017].

Brandeis, T.J.; Turner, J.A. 2009. U.S. Virgin Islands' forests, 2009. Resour. Bull. 196. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 56 p.

Brinckmann, J.; Hughes, K. 2010. Ethical trading and fair trade certification: the growing market for botanicals with ecological and social certification. HerbalGram: The Journal of the American Botanical Council. 88: 46.

Brown, N.C. 1950. Forest products: the harvesting, processing, and marketing of materials other than lumber, including the principal derivatives, extractives, and incidental products in the United States and Canada. New York: John Wiley and Sons. 339 p.

Bureau of Indian Affairs (BIA). 2015. What is the Federal Indian trust responsibility? BIA Frequently Asked Questions Website. https://www.bia.gov/FAQs/. [Date accessed: August 10, 2017].

Bureau of Land Management (BLM). 2014. Plant Conservation Alliance's Federal memorandum of understanding. Washington, DC: U.S. Department of the Interior, Bureau of Land Management. https://www.blm.gov/programs/natural-resources/native-plant-communities/national-seed-strategy/pca. [Date accessed: August 10, 2017].

Bureau of Land Management (BLM). 2015a. Native Plant Materials Development Program. Washington, D.C.: U.S. Department of the Interior, Bureau of Land Management. Website. http://www.blm.gov/wo/st/en/prog/more/fish__wildlife_and/plants/1.print.htm. [Date accessed: August 10, 2017].

Bureau of Land Management (BLM). 2015b. Forest and wood product permits. Washington, DC: U.S. Department of the Interior, Bureau of Land Management. https://www.blm.gov/programs/natural-resources/forests-and-woodlands/forest-product-permits. [Date accessed: August 14, 2017].

California Natural Resources Agency. 2009. California climate adaptation strategy: a report to the governor of the state of California in response to Executive Order S-13-2008. CA Natural Resources Agency. 197 p. http://resources.ca.gov/docs/climate/Statewide_Adaptation_Strategy.pdf. [Date accessed: August 9, 2017].

Chamberlain, J.L.; Bush R.J.; Hammett, A.L.; Araman, P.A. 2002. Eastern national forests—managing for nontimber products. Journal of Forestry. 100(1): 8–14.

Charnley, S.; Fischer, A.P.; Jones, E.T. 2008. Traditional and local ecological knowledge about forest biodiversity in the Pacific Northwest. Gen. Tech. Rep. PNW-GTR-751. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 52 p.

City of Boston. 2014a. Emerald necklace. City of Boston website. http://www.cityofboston.gov/Parks/emerald/. [Date accessed: August 10, 2017].

City of Boston. 2014b. Park rules and regulations. City of Boston website. http://www.cityofboston.gov/Parks/rules.asp. [Date accessed: August 9, 2017].

City of Portland. 2014. City of Portland park code—20.12.100 vandalism; protection of park property and vegetation. Portland, OR: City of Portland Park and Recreation. http://www.portlandonline.com/auditor/index.cfm?c=28627#cid_147783. [Date accessed: August 9, 2017].

City of Seattle. 2013. 2013 Urban forest stewardship plan. Seattle: City of Seattle. 78 p. http://www.seattle.gov/trees/docs/2013%20Urban%20Fores%20Stewardship%20Plan%20091113.pdf. [Date accessed: August 9, 2017].

Comer, P.J.; Young, B.; Schulz, K. [and others]. 2012. Climate change vulnerability and adaptation strategies for natural communities: piloting methods in the Mojave and Sonoran deserts. Report to the U.S. Fish and Wildlife Service. Arlington, VA: NatureServe. 75 p.

Comisión Nacional para el Conocimiento y Uso de la Biodiversidad [CONABIO]. 2008. International expert workshop on CITES non-detriment findings. Cancun, Mexico: CONABIO. http://www.conabio.gob.mx/institucion/cooperacion_internacional/TallerNDF/taller_ndf.html. [Date accessed: August 9, 2017].

Commonwealth of Puerto Rico. 1999. Ley No. 241, Nueva Ley de Vida Silvestre de Puerto Rico. San Juan, PR: Department of Natural and Environmental Resources.

Commonwealth of Puerto Rico. 2000. Ley No.13, Ley de Bosques de Puerto Rico. San Juan, PR: Department of Natural and Environmental Resources.

Connecticut Department of Energy and Environmental Protection. 2014. Endangered, threatened and special concern species in Connecticut. http://www.ct.gov/deep/cwp/view.asp?a=2702&q=323486. [Date accessed: August 9, 2017].

Convention on Biological Diversity (CBD). 2001. Sustainable management of nontimber forest resources. CBD Technical Series no. 6. Montreal, Canada: CBD Secretariat. 30 p.

Convention on Biological Diversity (CBD). 2002. COP 6 Decision VI/9: Global strategy for plant conservation. New York: United Nations. http://www.cbd.int/decision/cop/default.shtml?id=7183. [Date accessed: August 10, 2017].

Convention on Biological Diversity (CBD). 2004. Addis Ababa principles and guidelines for the sustainable use of biodiversity (CBD guidelines). Montreal, Canada: CBD Secretariat. 21 p. http://www.cites.org/sites/default/files/eng/res/13/addis-gdl-en.pdf. [Date accessed: August 10, 2017].

Convention on Biological Diversity (CBD). 2010. Global strategy for plant conservation 2011–2020. Montreal, Canada: CBD Secretariat. http://www.cbd.int/gspc/strategy.shtml. [Date accessed: August 10, 2017].

Convention on Biological Diversity (CBD). 2011. Nagoya Protocol on access to genetic resources and the fair and equitable sharing of benefits arising from their utilization to the convention on biological diversity. Montreal, Canada: CBD Secretariat. 25 p. http://www.cbd.int/abs/doc/protocol/nagoya-protocol-en.pdf. [Date accessed: August 10, 2017].

Convention on Biological Diversity (CBD). 2014. Convention on biological diversity website. Montreal, Canada: CBD Secretariat. http://www.cbd.int/. [Date accessed: August 10, 2017].

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). 2014a. CITES appendices I, II, and III. Geneva, Switzerland: United Nations Environment Programme. 46 p. http://www.cites.org/eng/app/appendices.php. [Date accessed: August 10, 2017].

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). 2014b. Resolution Conference 8.3 (Revised CoP13) Recognition of the benefits of trade in wildlife (1992). Geneva, Switzerland: United Nations Environment Programme. http://www.cites.org/eng/res/08/08-03R13.php. [Date accessed: August 10, 2017].

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). 2014c. Resolution Conf. 9.24 (Rev. CoP17) Criteria for amendment of appendices I and II (1994). Geneva, Switzerland: United Nations Environment Programme. http://www.cites.org/eng/res/09/09-24R16.php. [Date accessed: August 10, 2017].

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). 2014d. Resolution Conf. 9.25 (Rev. CoP17) Inclusion of species in Appendix III (1994). Geneva, Switzerland: United Nations Environment Programme. http://www.cites.org/eng/res/09/09-25R16.php. [Date accessed: August 10, 2017].

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). 2014e. Resolution Conf. 10.3 Designation and role of the scientific authorities (1997). Geneva, Switzerland: United Nations Environment Programme. http://www.cites.org/eng/res/10/10-03C15.php. [Date accessed: August 10, 2017].

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). 2014f. Resolution Conf. 10.19 (Rev. CoP14) Traditional medicines (1997). Geneva, Switzerland: United Nations Environment Programme. https://cites.org/eng/res/10/10-19R14C15.php. [Date accessed: August 10, 2017].

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). 2014g. Resolution Conf. 12.3 (Rev. CoP17) Permits and certificates (2002). Geneva, Switzerland: United Nations Environment Programme. https://cites.org/eng/res/12/12-03R17.php. [Date accessed: August 10, 2017].

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). 2014h. Resolution Conf. 13.2 (Rev. CoP14) Sustainable use of biodiversity: Addis Ababa Principles and Guidelines) (2004). Geneva, Switzerland: United Nations Environment Programme. https://www.cites.org/eng/res/13/13-02R14.php. [Date accessed: August 9, 2017].

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). 2014i. Resolution Conf. 16.6 CITES and livelihoods (Rev. CoP17). Geneva, Switzerland: United Nations Environment Programme. https://cites.org/sites/default/files/document/E-Res-16-06-R17.pdf. [Date accessed: August 10, 2017].

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). 2014j. Resolution Conf. 16.7 Non-detriment findings (Rev. CoP17). Geneva, Switzerland: United Nations Environment Programme. https://www.cites.org/eng/res/16/16-07.php. [Date accessed: August 10, 2017].

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). 2014k. What is CITES? Geneva, Switzerland: United Nations Environment Program. http://www.cites.org/eng/disc/what.php. [Date accessed: August 9, 2017].

Cooperative Forestry Assistance Act. 1978. 16 U.S.C. 2109(d)(1)) as amended by the Food, Conservation and Energy Act of2008 (Pub.L. 110-234) Title VIII—Forestry, Section 8005: Assistance of the Federated States of Micronesia, the Republic of the Marshall Islands, and the Republic of Palau.

Corbin, J.E. 2002. Conservation of species by protective marking. Native Plants Journal. 3: 98–99.

Cordalis, D.; Suagee, D.B. 2008. The effects of climate change on American Indian and Alaska Native tribes. Natural Resources and Environment. 22(3): 45–49.

Crespi, M.M. 2003. An overview of the ethnography program. Washington, DC: U.S. Department of the Interior, National Park Service. http://www.nps.gov/ethnography/training/TAPS/ethnoOverview.htm. [Date accessed: August 10, 2017].

Crook, C.; Clapp, R.C. 2002. The paradox of market-oriented conservation: lessons from the tropical forests. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber forest products in the United States. Lawrence, KS: University Press of Kansas: 163–179.

Cultural and Heritage Cooperation Authority of 2012; 25 U.S.C. 32a § 3055. http://uscode.house.gov/view.xhtml?path=/prelim@title25/chapter32A&edition=prelim. [Date accessed: August 10, 2017].

Dahl, T.E. 2011. Status and trends of wetlands in the conterminous United States, 2004 to 2009, report to Congress. Washington, DC: Department of the Interior, U.S. Fish and Wildlife Service. 108 p.

Danielsen, K.C.; Gilbert, J.H. 2002. Case study. Ojibwe off-reservation harvest of wild plants. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber forest products in the United States. Lawrence, KS: University Press of Kansas: 282–292.

Davoodian, N. 2015. Fungal conservation in the United States: current status of Federal frameworks. Biodiversity and Conservation. 24: 2099–2104.

Department of Defense (DoD). 2006. Department of Defense instruction number 4710.02: DoD interactions with federally-recognized Tribes. Washington, DC: U.S. Department of Defense. http://standards.globalspec.com/std/521231/dodd-4710-02. [Date accessed: August 10, 2017].

Department of Defense (DoD). 2013. Department of Defense Instruction Number 4715.03: Natural Resources Conservation Program. Washington, DC: U.S. Department of Defense. http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodm/471503m.pdf. [Date accessed: August 10, 2017].

Department of Defense (DoD). 2016. DoD Natural Resources Program. Washington, DC: U.S. Department of Defense. http://www.denix.osd.mil/nr/programinformation/natural-resources-program-overview/nrfactsheets/dod-natural-resources-conservation-program/. [Date accessed: August 10, 2017].

Department of Defense (DoD). [N.d.]. Accounting for production and sale of forest products. DoD Financial Management Regulation. Vol. 11A. Washington, DC: Department of Defense. Chapter 16.

Department of the Interior and Related Agencies Appropriations Act of 2000 (DOI appropriations 2000). 113 Stat. 1501. www.gpo.gov/fdsys/pkg/PLAW-106publ113/pdf/PLAW-106publ113.pdf. [Date accessed: August 10, 2017].

Department of the Interior and Related Agencies Appropriations Act of 2004 (DOI appropriations 2004). 117 Stat. 1312. http://www.gpo.gov/fdsys/pkg/PLAW-108publ108/pdf/PLAW-108publ108.pdf. [Date accessed: August 10, 2017].

Department of the Interior and Related Agencies Appropriations Act of 2008 (DOI appropriations 2008). 123 Stat. 2960. http://www.gpo.gov/fdsys/pkg/PLAW-111publ88/pdf/PLAW-111publ88.pdf. [Date accessed: August 10, 2017].

Department of the Interior and Related Agencies Appropriations Act of 2014 (DOI appropriations 2014). 128 Stat. 346. https://www.gpo.gov/fdsys/pkg/PLAW-113publ76/pdf/PLAW-113publ76.pdf. [Date accessed: August 10, 2017].

Department of State (DOS). 1976. Convention on international trade in endangered species of wild fauna and flora (1973). Treaties and Other International Acts Series 8249. Washington, DC: U.S. Department of State. 275 p.

Dunlap, T.R. 1989. The federal government, wildlife, and endangered species. In: Lacey, M.J., ed. Government and environmental politics: essays on historical developments since World War Two. Washington, DC: The Woodrow Wilson Center Press: 209–232.

East Bay Regional Park District. 2014. Rules and regulations: Ordinance 38. Section 804. July. http://www.ebparks.org/Page177.aspx. 36 p. [Date accessed: August 10, 2017].

East Bay Regional Park District. 2015. Healthy parks healthy people. http://www.ebparks.org/activities/hphp. [Date accessed: August 10, 2017].

Eastern Forest Environmental Threat Assessment Center (EFETAC). [N.d.]. ForWarn—national resilience toolkit. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. http://forwarn.forestthreats.org/. [Date accessed: August 10, 2017].

Emery, M.R.; McLain, R.J. 2001. Nontimber forest products: medicinal herbs, fungi, edible fruits and nuts, and other natural products from the forest. Journal of Sustainable Forestry. 13(3/4): 176.

Emery, M.R.; Pierce, A.R. 2005. Interrupting the telos: locating subsistence in contemporary U.S. forests. Environment and Planning. 37: 981–993.

Emery, M.R.; Pierce, A.R.; Schroeder, R. 2004. Criterion 6, Indicator 47 area and per cent of forest land used for subsistence purposes. Submission to the U.S. National Report on Sustainable Forests—2010.

Endangered Species Act of 1973 [ESA]; 16 U.S.C. 1531–1536, 1538–1540.

Endangered Species Act of Guam. 5 GCA 63.63301-63304 Public Law 26-76:8, April 14, 2006.

Environmental Protection Agency [EPA]. 2014. Climate change indicators in the United States, 2014. 3rd ed. EPA 430-R-14-004. Washington, DC: U.S. Environmental Protection Agency. https://www.epa.gov/sites/production/files/2016-07/documents/climateindicators-full-2014.pdf. [Date accessed: August 10, 2017].

Executive Order (EO) 12898. 1994. Actions to address environmental justice in minority populations and low-income populations. Federal Register 59: 7629. https://portal.hud.gov/hudportal/HUD?src=/program_offices/fair_housing_equal_opp/FHLaws/EXO12898. [Date accessed: July 24, 2017].

Executive Order (EO) 12996. 1996. Management and general public use of the national wildlife refuge system. Federal Register 61: 13647. http://www.fws.gov/refuges/policiesandbudget/EO12996.html. [Date accessed: August 10, 2017].

Executive Order (EO) 13175. 2000 Consultation and coordination with Indian tribal governments. 2000. Federal Register 65: 67249. https://www.federalregister.gov/documents/2000/11/09/00-29003/consultation-and-coordination-with-indian-tribal-governments. [Date accessed: August 10, 2017].

Executive Order (EO) 13653. 2013. Preparing the United States for the impacts of climate change. Federal Register 78: 66817. https://www.federalregister.gov/documents/2013/11/06/2013-26785/preparing-the-united-states-for-the-impacts-of-climate-change. [Date accessed: August 10, 2017].

Federal Geographic Data Committee [FGDC]. 2013. Classification of wetlands and deepwater habitats. FGDC-STD-004-2013. 2nd ed. Washington, DC: U.S. Federal Geographic Data Committee, Wetlands Subcommittee, and U.S. Fish and Wildlife Service. 85 p.

Federal Register. 1983. Preservation of natural, cultural and archeological resources. 48 FR 30282, June 30, 1983; as amended at 81 FR 45037, July 12, 2016.

Federal Register. 1993a. Endangered and threatened wildlife and plants; endangered or threatened status for seven central Florida plants. 50 CFR Part 17. 58 FR 25746, April 27, 1993.

Federal Register. 1993b. Endangered and threatened wildlife and plants; proposed endangered status for *Gymnoderma lineare*. 58 FR 68623; Dec. 28, 1993.

Federal Register. 1995. Endangered and threatened wildlife and plants; *Gymnoderma lineare* (rock gnome lichen) determined to be endangered. 60 FR 3557; Jan. 18, 1995.

Federal Register. 2007. Sale and disposal of national forest system timber; special forest products and forest botanical products. Proposed rule; request for comments. 72(203) FR: 59496–59506.

Federal Register. 2008. Sale and disposal of national forest system timber; special forest products and forest botanical products. Final Rule. Federal Register. 73(249): 79367–79393.

Federal Register. 2009a. Sale and disposal of national forest system timber; special forest products and forest botanical products. Final rule; notice of delay of effective date and comment period. Federal Register. 74(18) 5107.

Federal Register. 2009b. Sale and disposal of national forest system timber; special forest products and forest botanical products. Notice of delay of effective date. Federal Register, 74(59) 14049.

Federal Register. 2009c. Sale and disposal of national forest system timber; special forest products and forest botanical products. Notice of delay of effective date. Federal Register. 74(103): 26091–26092.

Federal Register. 2012. National forest system land management planning, final rule and record of decision. Federal Register. 77(68): 21162–21276.

Federal Register. 2014. Sale and disposal of national forest system timber; forest products for traditional and cultural purposes. Proposed rule and request for comments. Federal Register. 79(147): 44327–44332.

Federal Register. 2015. Gathering of certain plants or plant parts by federally recognized Indian tribes for traditional purposes. Proposed rule and request for comments. Federal Register. 80(75): 21674–21681.

Federal Register. 2016. Sale and disposal of national forest system timber; forest products for traditional and cultural purposes. Final rule. Federal Register, 81(186): 65891-65897. https://www.gpo.gov/fdsys/pkg/FR-2016-09-26/pdf/2016-22929.pdf. [Date accessed: August 10, 2017].

Fish and Wildlife Service (FWS). 2010. Rising to the challenge: strategic plan for responding to accelerating climate change. Washington, DC: U.S. Department of the Interior, Fish and Wildlife Service. 36 p. https://www.fws.gov/home/climatechange/pdf/CCStrategicPlan.pdf. [Date accessed: August 10, 2017].

Fish and Wildlife Service (FWS). 2012. National Wildlife Refuge System policies. Washington, DC: U.S. Department of the Interior, Fish and Wildlife Service. http://www.fws.gov/refuges/policiesandbudget/refugepolicies.html. [Date accessed: August 10, 2017].

Fish and Wildlife Service (FWS). 2014a. Convention on international trade in endangered species. Arlington, VA: U.S. Department of the Interior, Fish and Wildlife Service, International Affairs Program. 2 p. http://www.fws.gov/international/pdf/factsheet-cites-overview-2014.pdf. [Date accessed: August 10, 2017].

Fish and Wildlife Service (FWS). 2014b. Legislative mandates and authorities. Washington, DC: Department of the Interior, Fish and Wildlife Service. http://www.fws.gov/refuges/policiesandbudget/mandates.html. [Date accessed: August 10, 2017].

Fish and Wildlife Service (FWS). 2014c. The United States Department of the Interior budget justifications and performance information, fiscal year 2015. Washington, DC: U.S. Department of the Interior, Fish and Wildlife Service. 508 p. https://www.fws.gov/budget/2014/FY2015_FWS_Greenbook-DOI31014.pdf. [Date accessed: July 7, 2017].

Fish and Wildlife Service (FWS). 2015a. List of states and tribes with approved export programs for furbearers, alligators, and ginseng. Washington, DC: U.S. Department of the Interior, Fish and Wildlife Service. http://www.fws.gov/international/pdf/table-list-of-states-and-tribes-with-approved-export-programs-for-furbearers-alligators-and-ginseng.pdf. [Date accessed: January 9, 2015].

Fish and Wildlife Service (FWS). 2015b. U.S. Fish and Wildlife Service——service manual chapters. Washington, DC: U.S. Department of the Interior, Fish and Wildlife Service. http://www.fws.gov/policy/manuals/. [Date accessed: August 10, 2017].

Fish and Wildlife Service (FWS). 2017. Endangered Species Database. http:www.fws.gov/endangered.http://www.fws.gov/endangered/. [Date accessed: August 17, 2017].

Fisher, A.H. 2002. Case study. Making peace in the berry patch: the 1932 handshake agreement and the promise of cultural use zones. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber forest products in the United States. Lawrence, KS: University Press of Kansas: 293–299.

Florida Department of Agriculture and Consumer Services (FDACS). 2016. State forest fees and information. http://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/Recreation/Fees-and-Information. [Date accessed: August 10, 2017].

Florida Division of Forestry. 2005. Wakulla State Forest: ten year resource management plan. Tallahassee: Florida Department of Agriculture and Consumer Services. 44 p.

Florida Division of Forestry. 2013. Goethe State Forest: ten year resource management plan. Tallahassee: Florida Department of Agriculture and Consumer Services. 80 p.

Florida House of Representatives. 2000. A study of the harvest of the saw palmetto berry. Tallahassee: Florida House of Representatives, Committee on Agriculture. http://archive.flsenate.gov/data/Publications/2000/House/reports/interim_reports/pdf/sawpalm.pdf. [Date accessed: August 10, 2017].

Florida State Legislature. 1997. Title 35 § 604:15. Florida statutes. http://leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&URL=0600-0699/0604/0604.html. [Date accessed: August 10, 2017].

Foderaro, L.W. 2011. Enjoy park greenery, city says, but not as salad. New York Times. July 29.

Folke, C.; Hahn, T.; Olsson, P.; Norberg, J. 2005. Adaptive governance of social-ecological systems. Annual Review of Environmental Resources. 30: 441–473.

Food and Agriculture Organization of the United Nations (FAO). 1985. Committee on forest development in the tropics. 1985. Tropical forestry action plan. Rome: FAO. http://www.ciesin.columbia.edu/docs/002-162/002-162.html. [Date accessed: August 10, 2017].

Food and Agriculture Organization of the United Nations (FAO). 1997. The state of the world's forests. Rome: FAO. http://www.fao.org/docrep/w4345e/w4345e00.htm. [Date accessed: August 10, 2017].

Food and Agriculture Organization of the United Nations (FAO). 1999a. The state of the world's forests. Rome: FAO. www.fao.org/docrep/W9950E/W9950E00.htm. [Date accessed: August 10, 2017].

Food and Agriculture Organization of the United Nations (FAO). 1999b. Towards a harmonized definition of non-wood forest products. Unasylva. 50(198): 63–64.

Food and Agriculture Organization of the United Nations (FAO). 2013. Climate change guidelines for forest managers. Rome: FAO. www.fao.org/docrep/018/i3383e/i3383e00.htm. [Date accessed: August 10, 2017].

Food and Agriculture Organization of the United Nations (FAO). 2014a. Forestry: non-wood forest products. www.fao.org/forestry/nwfp/en/. [Date accessed: August 10, 2017].

Food and Agriculture Organization of the United Nations (FAO). 2014b. The state of the world's forests. Rome: FAO. http://www.fao.org/3/a-i3710e.pdf. [Date accessed: August 10, 2017].

Food and Agriculture Organization of the United Nations (FAO). 2014c. The state of the world's forest genetic resources. Rome: FAO.

Food and Agriculture Organization of the United Nations (FAO). 2015. A short history of FAO. www.fao.org/about/en/. [Date accessed: January 26, 2015].

Food and Agriculture Organization of the United Nations, Sub-Regional Office for East and Southern Africa (FAO SAFR). 1998. Wetland characterization and classification for sustainable agricultural development. Proceedings of the sub-regional consultation; 1997 December 2-6; Harare, Zimbabwe. http://www.fao.org/docrep/003/x6611e/x6611e03d.htm. [Date accessed: August 10, 2017].

Food, Conservation, and Energy Act of 2008 [Farm Bill]; 122 Stat. 165, §8105. https://www.gpo.gov/fdsys/pkg/PLAW-110publ246/pdf/PLAW-110publ246.pdf. [Date accessed: August 10, 2017].

Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA); 16 U.S.C. §1601. https://www.law.cornell.edu/uscode/text/16/chapter-36. [Date accessed: August 10, 2017].

Forestry Program. 2010. American Samoa forest assessment and resource strategy, 2011–2015. Pago Pago, American Samoa: Division of Community and Natural Resources. 63 p. http://www.wflccenter.org/islandforestry/americansamoa.pdf. [Date accessed: August 10, 2017].

Galbraith, D.; Kennedy, K. 2006. The development of a strategic plan for a regional network of botanic gardens for conservation: the North American experience. Botanic Gardens Conservation International Journal. 3(1). http://www.bgci.org/worldwide/article/489/. [Date accessed: August 10, 2017].

Gange, A.C.; Gange, E.G.; Sparks, T.H.; Boddy, L. 2007. Rapid and recent changes in fungal fruiting patterns. Science. 316: 71.

Gardner, R.C.; Connolly, K.D. 2007. The Ramsar Convention on wetlands: assessment of international designations within the United States. Environmental Law Reporter. 37: 10089–10113. http://www.ramsar.org/sites/default/files/documents/pdf/wurc/wurc_gardner_elr2007.pdf. [Date accessed: August 10, 2017].

General Accounting Office (GAO). 1996. National Park Service—activities within park borders have caused damage to resources [report to U.S. House subcommittee]. GAO/RCED-96-202. Washington, DC: U.S. General Accounting Office. 32 p. http://www.gpo.gov/fdsys/pkg/GAOREPORTS-RCED-96-202/pdf/GAOREPORTS-RCED-96-202.pdf. [Date accessed: August 10, 2017].

George, S.; Snape, W.J., III; Senatore, M. 1998. State Endangered Species Acts: past, present and future. Washington, DC: Defenders of Wildlife. 5 p.

Gilliam, F.S. 2007. The ecological significance of the herbaceous layer in temperate forest ecosystems. BioScience. 57(10): 845–858.

Global Partnership on Forest Landscape Restoration (GPFLR). 2013. Gland, Switzerland: International Union for Conservation of Nature. http://www.forestlandscaperestoration.org. [Date accessed: August 15, 2017].

Glowka, L.; Burhenne-Guilmin, F.; Synge, H. [and others]. 1994. A guide to the convention on biological diversity, environmental policy and law paper no. 30. Gland, Switzerland: International Union for the Conservation of Nature. 161 p. https://portals.iucn.org/library/efiles/documents/EPLP-no.030.pdf. [Date accessed: July 7, 2017].

Goodman, E.C. 2002. Indian reserved rights. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber forest products in the United States. Lawrence, KS: University Press of Kansas: 273–281.

Gorte, R.W.; Vincent, C.H.; Hanson, L.A.; Rosenblum, M.R. 2012. Federal land ownership: overview and data. CRS Report for Congress. Report R42346. Washington, DC: Congressional Research Service. 24 p.

Greene, S.M.; Hammett, A.L.; Kant, S. 2000. Nontimber forest products marketing systems and market players in Southwest Virginia; crafts, medicinal and herbal, and specialty wood products. Journal of Sustainable Forestry. 11(3): 19–39.

Gross, W.T. 1981. Tribal resources: federal trust responsibility: United States energy development versus trust responsibilities to Indian tribes. American Indian Law Review. 9(2): 309–343.

Guldin, R.W.; Kaiser, H.F. 2004. National report on sustainable forests—2003. FS-766. Washington, DC: U.S. Department of Agriculture, Forest Service. http://www.fs.fed.us/research/sustain/docs/national-reports/2003/2003-sustainability-report.pdf. [Date accessed: August 10, 2017].

Haig, S.M.; Beever, E.A.; Chambers, S.M. [and others]. 2006. Taxonomic considerations in listing subspecies under the U.S. Endangered Species Act. Conservation Biology. 20(6): 1584–1594.

Handler, S.; Duveneck, M.; Iverson, L. [and others]. 2014. Minnesota forest ecosystem vulnerability assessment and synthesis: a report from the northwoods climate change response framework. Gen. Tech. Rep. NRS-133. Newtown Square, PA; U.S. Department of Agriculture, Forest Service, Northern Research Station. 228 p.

Hawai'i Legislative Reference Bureau. 2015. The Constitution of the State of Hawai'i: Article XII, Section 7. http://www.lwv-Hawai'i.com/govt/constitution/art12.htm#07. [Date accessed: August 10, 2017].

Hayes, T.; Persha, L. 2010. Nesting local forestry initiatives: Revisiting community forest management in a REDD+ world. Forest Policy and Economics. 12(8): 545–553.

Heywood, V.H.; Dulloo, M.E. 2005. In situ conservation of wild plant species: a critical global review of good practices. IPGRI Tech. Bull. 11. Rome: International Plant Genetic Resources Institute. 174 p.

Indian Forest Management Assessment Team (IFMAT). 1993. An assessment of Indian forests and forest management in the United States. Portland, OR: Intertribal Timber Council. 174 p. http://www.itcnet.org/issues_projects/issues_2/forest_management/assessment.html. [Date accessed: August 10, 2017].

Indian Forest Management Assessment Team (IFMAT). 2003. An assessment of Indian forests and forest management in the United States by the second Indian Forest Management Assessment Team for the Intertribal Timber Council. Portland, OR: Intertribal Timber Council. 134 p. http://www.itcnet.org/issues_projects/issues_2/forest_management/assessment.html. [Date accessed: August 10, 2017].

Indian Forest Management Assessment Team (IFMAT). 2013. Assessment of Indian forests and forest management in the United States, final report, volume 1. Portland, OR: Intertribal Timber Council. 62 p. http://www.itcnet.org/issues_projects/issues_2/forest_management/assessment.html. [Date accessed: August 10, 2017].

Indian Self-Determination and Education Assistance Act of 1975; 25 U.S.C. 450 et seq. https://www.law.cornell.edu/uscode/text/25/chapter-14/subchapter-II. [Date accessed: August 10, 2017].

International Tropical Timber Council (ITTC). 2014. Report of the International Tropical Timber Council at its fiftieth session. Yokohama, Japan: International Timber Council. 408 p. http://www.itto.int/council_documents/. [Date accessed: August 10, 2017].

International Tropical Timber Organization (ITTO). 1992. ITTO guidelines for the sustainable management of natural tropical forests. Yokohama, Japan: International Tropical Timber Organization Policy Development Series 1. 18 p. https://blogs.ubc.ca/apfnet01/files/2015/01/Sustainable-management-of-natural-tropical-forests.pdf. [Date accessed: August 14, 2017].

International Tropical Timber Organization (ITTO). 2006. ITTO Members under ITTA. Yokohama, Japan: International Tropical Timber Organization. http://www.itto.int/itto_members/. [Date accessed: August 10, 2017].

International Tropical Timber Organization (ITTO). 2014. Project portfolio. Yokohama, Japan: International Tropical Timber Organization. http://www.itto.int/portfolio01/. [Date accessed: August 10, 2017].

International Tropical Timber Organization/International Union for the Conservation of Nature (ITTO/IUCN). 2009. ITTO/IUCN guidelines for the conservation and sustainable use of biodiversity in tropical timber production forests. Yokohama, Japan: International Tropical Timber Organization. 120 p.

International Union for the Conservation of Nature (IUCN). 2014. About IUCN. Gland, Switzerland: IUCN. www.iucn.org./about/. [Date accessed: August 10, 2017].

International Union for the Conservation of Nature (IUCN). 2015. IUCN species. Gland, Switzerland: IUCN. www.iucn.org./about/work/programmes/species. [Date accessed: August 10, 2017].

Intertribal Timber Council (ITC). 2013. Fulfilling the promise of the Tribal Forest Protection Act of 2004: an analysis by the Intertribal Timber Council in collaboration with USDA Forest Service and Bureau of Indian Affairs. Cooperative Agreement 11-CA-11132540-304. Portland, OR: Intertribal Timber Council. 2 p. http://www.itcnet.org/issues_projects/issues_2/tfpa/tfpareports.html. [Date accessed: August 10, 2017].

Iowa Department of Natural Resource (IA DNR). 2015. State parks rules and regulations. http://www.iowadnr.gov/recreation/campingfacilityrentals/rulesregulations.aspx. [Date accessed: August 10, 2017].

Itasca County [MN]. 2009. Land management plan. 2010. Itasca County, MN. http://www.co.itasca.mn.us/235/Land-Management-Planning. [Date accessed: August 10, 2017].

Jacobson, K.; Hansen, M.; McRoberts, R. 2005. Balsam boughs in Minnesota: a resource and market study. St. Paul, MN: Minnesota Department of Natural Resources. 46 p. http://files.dnr.state.mn.us/forestry/um/balsamboughs_mn_resource_market_study.pdf. [Date accessed: August 10, 2017].

Jahnige, P. 2002. Case study: the hidden bounty of the urban forest. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber forest products in the United States. Lawrence, KS: University Press of Kansas: 96–107.

Janowiak, M.; Iverson, L.; Mladenoff, D. [and others]. 2014. Forest ecosystem vulnerability assessment and synthesis for northern Wisconsin and western Upper Michigan: a report from the northwoods climate change response framework. Gen. Tech. Rep. NRS-136. Newtown Square, PA: U.S. Dept. of Agriculture, Forest Service, Northern Research Station. 247 p.

Johnson, S.; Abrams, M.; Rush, L. 2012. Using black earth and remote sensing of indicator plants for identification of prehistoric archeological sensitivity and potential site integrity in the eastern woodlands. Publ. 10–416. Washington, DC: U.S. Department of Defense, Legacy Program. 1 p.

Jones, E.T.; Lynch, K. 2002. The relevance of sociocultural variables to nontimber forest product research, policy, and management. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber Forest Products in the United States. Lawrence, KS: University Press of Kansas: 26–51.

Jones, E.T.; McLain, R.; Lynch, K.A. 2005. The relationship between nontimber forest products and biodiversity in the United States. Washington, DC: National Commission on Science for Sustainable Forestry. 60 p.

Jones, E.T.; McLain, R.; Weigand, J., eds. 2002. Nontimber forest products in the United States. Lawrence, KS: University Press of Kansas. 445 p.

Joyce, L.; Haynes, R.; White, R.; Barbour, J. 2006. Bringing climate change into natural resource management: proceedings. Gen. Tech. Rep. PNW-GTR-706. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 150 p.

Joyce, L.A.; Blate, G.M.; McNulty, S.G. [and others]. 2009. Managing for multiple resources under climate change: national forests. Environmental Management. 44: 1022–1032.

Kauserud, H.; Stige, L.C.; Vik, J.O. [and others]. 2008. Mushroom fruiting and climate change. PNAS. 105(10): 3811–3814. http://www.pnas.org/content/105/10/3811.full. [Date accessed: August 10, 2017].

Kemp, K.B.; Blades, J.J.; Klos, P.Z. [and others]. 2015. Managing for climate change on Federal lands of the Western United States: perceived usefulness of climate science, effectiveness of adaptation strategies, and barriers to implementation. Ecology and Society. 20(2): 17.

Kerr, W.A.; Gaisford, J.D., eds. 2007. Handbook on international trade policy. Cheltenham: Edward Elgar Publishing Ltd. 545 p.

Lacey Act of 1900; 16 U.S.C. 3371–3378.

Laird, S.A.; McLain, R.; Wynberg, R.P., eds. 2010. Wild product governance: finding policies that work for nontimber forest products. Washington, DC: Earthscan.

Laird, S.A.; Wynberg, R.; McLain, R.J. 2009. Wild product governance: laws and policies for sustainable and equitable nontimber forest product use. [Place of publication unknown]: United Nations University, the Center for International Forestry Research, People and Plants International, the Institute for Culture and Ecology, and the University of Cape Town. 14 p. http://archive.ias.unu.edu/resource_centre/policy%20brief_Oct_09_rev3.1.pdf. [Date accessed: July 7, 2017].

Laird, S.A.; Wynberg, R.; McLain, R.J. 2011. Regulating complexity: policies for the governance of nontimber forest products. In: Shackleton, S.; Shackleton, C.; Shanley, P., eds. Nontimber forest products in the global context. Heidelberg, Germany: Springer-Verlag: 227–253.

Lawler, J.J. 2009. Climate change adaptation strategies for resource management and conservation planning. Annals of the New York Academy of Sciences. 1162: 79–98.

Lewis County, Washington. [N.d.]. Forest products harvesting permits. Chehallis, Washington: Lewis County, Office of the Sheriff. http://lewiscountywa.gov/forest-products-harvesting-permits. [Date accessed: August 10, 2017].

Liu, Z. 2007. Tropical forests of the United States: applying USDA state and private forestry programs. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Forest Health Protection. http://www.wflccenter.org/news_pdf/259_pdf.pdf. [Date accessed: August 10, 2017].

London, J.K. 2002. Case study. American Indian management of Federal lands: the Maidu Cultural Development Group. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber forest products in the United States. Lawrence, KS: University Press of Kansas: 317–344.

Ma, H.O. 2002. ITTOs experiences in promoting tropical nontimber forest products. NonWood Forest Products. 14: 69–74.

Mallet, P. 2002. Case study. Certification of nontimber forest products. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber Forest Products in the United States. Lawrence, KS: University Press of Kansas: 189–198.

Matthews, G.V.T. 1993. The Ramsar Convention on wetlands: its history and development. Gland, Switzerland: Ramsar Convention Bureau. http://www.ramsar.org/sites/default/files/documents/pdf/lib/Matthews-history.pdf. [Date accessed: August 10, 2017].

McLain, R.; Jones, E.T. 2002. Introduction. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber forest products in the United States. Lawrence, KS: University Press of Kansas: xvii–xxv.

McLain, R.; Jones, E.T. 2005. Nontimber forest products management on national forests in the United States. Gen. Tech. Rep. PNW-GTR-655. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 85 p.

McLain, R.J.; Hurley, P.T.; Emery, M.R.; Poe, M.R. 2014. Gathering "wild" food in the city: rethinking the role of foraging in urban ecosystem planning and management. Local Environment: The International Journal of Justice and Sustainability. 19(2): 220–240.

McLain, R.J.; Lynch, K. 2010. Managing floral greens in a globalized economy: resource tenure, labour relations and immigration policy in the Pacific Northwest, USA. In: Laird, S.A.; McLain, R.J.; Wynberg, R.P., eds. Wild product governance: finding policies that work for nontimber forest products. London: Earthscan: 265–285.

McMahon, L. 1980. Comment: legal protection for rare plants. American University Law Review. 29(3): 515–569.

McReynolds, K. 2010. Arizona native plant law: what you need to know. Publication AZ1506. Tucson: The University of Arizona, Arizona Cooperative Extension. http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1506.pdf. [Date accessed: August 10, 2017].

Medicinal Plant Specialist Group (MPSG). 2007. International standard for sustainable wild collection of medicinal and aromatic plants (ISSC-MAP). Version 1.0. Bonn, Germany: Bundesamt für Naturschutz (BfN).

Medicinal Plant Specialist Group (MPSG). 2012. Medicinal plant specialist group. Gland, Switzerland: International Union for Conservation of Nature. http://www.iucn.org/about/work/programmes/species/who_we_are/ssc_specialist_groups_and_red_list_authorities_directory/plants/ssc_medicinalplant_home/. [Date accessed: August 10, 2017].

Miller, J.S.; Krupnick, G.A.; Stevens, H. [and others]. 2013. Toward target 2 of the global strategy for plant conservation: an expert analysis of the Puerto Rican flora to validate new streamlined methods for assessing conservation status. Annals of the Missouri Botanical Garden. 99(2): 199–205.

Mitchell, C.M. 2014. Contested spaces: NTFPs, livelihoods, and conservation planning. Boca Raton, FL: Florida Atlantic University. Ph.D. dissertation.

Montreal Process Working Group (MPWG). 1995. Criteria and indicators for the conservation and sustainable management of temperate and boreal forests. Santiago, Chile: Meeting of the Montreal Process Working Group. 13 p. montrealprocess.org/documents/publications/techreports/1995santiago_e.pdf. [Date accessed: August 10, 2017].

Montreal Process Working Group (MPWG). 2000. Montreal Process year 2000 progress report-progress and innovation in implementing criteria and indicators for the conservation and sustainable management of temperate and boreal forests. Ontario, Canada: Montreal Process Liaison Office-Canadian Forest Service. 97 p. montrealprocess.org/documents/publications/techreports/2000progressreport_e.pdf. [Date accessed: August 10, 2017].

Montreal Process Working Group (MPWG). 2009. Technical notes on implementation of the Montreal Process criteria and indicators: Criteria 1–7. Third Edition.

Multiple Use–Sustained Yield Act of 1960; 16 U.S.C. 528 et seq.

National Environmental Policy Act of 1969 [NEPA]; 42 U.S.C. 4321 et seq.

National Fish, Wildlife and Plants Climate Adaptation Partnership (NFWPCAP). 2012. National fish, wildlife and plants climate adaptation strategy. Washington, DC: Association of Fish and Wildlife Agencies [and other agencies and NGOs]. https://www.wildlifeadaptationstrategy.gov/. [Date accessed: July 7, 2017].

National Forest Management Act of 1976 (NFMA); 16 U.S.C. 1600.

National Historic Preservation Act (NHPA) of 1966; 16 U.S.C. 470 et seq.

National Indian Forest Resources Management Act of 1990; 25 U.S.C. § 3103(3).

National Oceanic and Atmospheric Administration (NOAA). 2014. Convention on biological diversity. Silver Spring, MD: U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Fisheries-Office of International Affairs. http://www.nmfs.noaa.gov/ia/intlagree/cbd.htm. [Date accessed: August 10, 2017].

National Park Service (NPS). 2003. Funding the natural resource challenge. Report to Congress, fiscal year 2003. Washington, DC: Department of the Interior, National Park Service. 111 p. http://www.nature.nps.gov/challenge/assets/docs/RTC2003.pdf. [Date accessed: August 10, 2017].

National Park Service (NPS). 2004. Natural resource year in review-2004. Washington, DC: Department of the Interior, National Park Service, Natural Resource Information Division. 118 p. http://www.nature.nps.gov/publications/assets/docs/yir2004.pdf. [Date accessed: August 10, 2017].

National Park Service (NPS). 2006. National Park Service management policies. Washington, DC: Department of the Interior, National Park Service. 168 p. http://www.nps.gov/policy/MP2006.pdf. [Date accessed: August 10, 2017].

National Park Service (NPS). 2014. The United State Department of the Interior budget justifications and performance information, fiscal year 2015. Washington, DC: Department of the Interior, National Park Service. 624 p. http://www.nps.gov/aboutus/upload/FY-2015-Greenbook-Linked.pdf. [Date accessed: August 10, 2017].

National Park Service (NPS). 2017. Forest Health. http://www.nature.nps.gov/biology/foresthealth.cfm. [Date accessed: August 17, 2017].

National Wildlife Refuge System Administration Act of 1966 (NWRSA); 16 U.S.C. 668dd-668ee.

Negrón-Ortiz, V. 2014. Pattern of expenditures for plant conservation under the Endangered Species Act. Biological Conservation. 171: 36–43.

New York City Parks Administrative Code (NYC). 2014. Title 56–Department of Park and Recreation–prohibited uses. New York, NY: Department of Parks and Recreation. https://www.nycgovparks.org/rules/section-1-04. [Date accessed: August 10, 2017].

Office of Technology Assessment (OTA). 1987. Integrated renewable resource management for U.S. insular areas. OTA-F-325. Washington, DC: U.S. Congress, Office of Technology Assessment. 443 p.

Oregon Department of Forestry (ODF). 2009. Pathway to the future for Northwest Oregon state forests. http://library.state.or.us/repository/2009/200912171142054/index.pdf. [Date accessed: August 10, 2017].

Oregon Department of Forestry (ODF). 2015a. Special forest products for personal use. http://www.oregon.gov/ODF/Documents/WorkingForests/SpecialForestProductsPersonalUse.pdf. [Date accessed: August 10, 2017].

Oregon Department of Forestry (ODF). 2015b. Special forest products for commercial use. http://www.oregon.gov/ODF/Documents/WorkingForests/SpecialForestProductsCommercialUse.pdf. [Date accessed: August 10, 2017].

Organic Administration Act of 1897; 16 U.S. Code § 473. http://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title16-section473&num=0&edition=prelim. [Date accessed: August 10, 2017].

Panayotou, T.; Ashton, P. 1992. Not by timber alone: economics and ecology for sustaining tropical forests. Washington, DC: Island Press. 282 p.

Parks, Forests, and Public Property. Code of Federal Regulations. Title 36. [36 CFR]. https://www.ecfr.gov/cgi-bin/text-idx?SID=041c1e04ce39ce5743b4b7aa29bdd91f&mc=true&tpl=/ecfrbrowse/Title36/36tab_02.tpl. [Date accessed: August 10, 2017].

Pennsylvania Bureau of Forestry. 2015. Summary of significant changes in the draft Pennsylvania State Forest Resource Management Plan. http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_20031271.pdf. [Date accessed: August 10, 2017].

Pennsylvania Bureau of Forestry. 2016. State Forest Resource Management Plan: nontimber forest products. Harrisburg, PA: Department of Conservation and Natural Resources-Bureau of Forestry. http://dcnr.state.pa.us/forestry/stateforestmanagement/sfrmp/index.htm. [Date accessed: August 10, 2017].

Peterson, D.L.; Millar, C.I.; Joyce, L.A. [and others]. 2011. Responding to climate change in national forests: a guidebook for developing adaptation options. Gen. Tech. Rep. PNW-GTR-855. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 109 p.

Peterson, D.L.; Vose, J.M.; Patel-Weynand, T., eds. 2013. Climate change and the United States forests. Heidelberg, Germany: Springer-Verlag. 261 p.

Pierce County, Washington. 2014. Development regulations, forest practices, Title 18H. Pierce County, WA: Pierce County Government. http://www.codepublishing.com/WA/PierceCounty/html/PierceCounty18H/PierceCounty18H.html. [Date accessed: August 10, 2017].

Pilot Program of Charges and Fees for Harvest of Forest Botanical Products of 2000; 113 STAT 1505 Sec 339. https://www.gpo.gov/fdsys/pkg/PLAW-106publ113/pdf/PLAW-106publ113.pdf. [Date accessed: August 10, 2017].

Plantlife International. 2012. Wild plant horizons: taking forward the global strategy for plant conservation 2011–2010. Salisbury, England: Plantlife International. http://plantlife.love-wildflowers.org.uk/publications/wildplanthorizons. [Date accessed: August 10, 2017].

Pokladnik, R. 2008. Roots and remedies of ginseng poaching in Central Appalachia. Yellow Springs, OH: Antioch University. Ph.D. dissertation.

Porter, F.W., III, ed. 1990. The art of Native American basketry: a living legacy. Westport, CT: Greenwood Press. 350 p.

Public Employees for Environmental Responsibility (PEER). 2010. Native American plant gathering in the National Park system. Silver Spring, MD: Public Employees for Environmental Responsibility. 16 p. https://www.peer.org/assets/docs/nps/8_11_10_Indian_Plant_Take_from_National_Parks.pdf. [Date accessed: July 13, 2017].

Puerto Rico Department of Natural and Environmental Resources (PRDNER). 2005. Puerto Rico critical wildlife areas. Project R-3.1. San Juan, PR: Bureau of Fish and Wildlife, Terrestrial Resources Division. 394 p.

Ramsar. 2010. Handbook 1: wise use of wetlands: concepts and approaches for the wise use of wetlands. 4th ed. Gland, Switzerland: Ramsar Convention Secretariat. http://www.ramsar.org/sites/default/files/documents/library/hbk4-01.pdf. [Date accessed: August 10, 2017].

Ramsar. 2012. Classification system for wetland type. Gland, Switzerland: Ramsar Convention Secretariat. archive.ramsar.org/cda/en/ramsar-documents-guidelines-classification-system/main/ramsar/1-31-105%5E21235_4000_0__. [Date accessed: August 10, 2017].

Ramsar. 2014a. Ramsar country profiles. Gland, Switzerland: Ramsar Convention Secretariat. http://www.ramsar.org/country-profiles. [Date accessed: August 10, 2017].

Ramsar. 2014b. Wetlands and agriculture: partners for growth. Gland, Switzerland: Ramsar Convention Secretariat, International Water Management Institute. http://www.ramsar.org/sites/default/files/wwd14_leaflet_en.pdf. [Date accessed: August 10, 2017].

Rosser, A.R.; Haywood M.J. 2002. Guidance for CITES scientific authorities: checklist to assist in making non detriment findings for appendix II exports. Gland, Switzerland: International Union for Conservation of Nature. 146 p. https://portals.iucn.org/library/node/8121. [Date accessed: August 10, 2017].

Russi, D.; ten Brink, P.; Farmer, A. [and others]. 2013. The economics of ecosystems and biodiversity for water and wetlands. London: Institute for European Environmental Policy. http://doc.teebweb.org/wp-content/uploads/2013/04/TEEB_WaterWetlands_Report_2013.pdf. [Date accessed: August 10, 2017].

Sands, P.; Peel, J.; Fabra, A.; MacKenzie, R. 2012. Principles of environmental law, 3rd edition. Cambridge, UK: Cambridge University Press. 988 p.

Schmidt, P.M.; Peterson, M.J. 2009. Biodiversity conservation and indigenous land management in the era of self-determination. Conservation Biology. 23(6): 1458–1466.

Schroeder, R. 2002. Case study. Contemporary subsistence use of nontimber forest products in Alaska. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber forest products in the United States. Lawrence, KS: University Press of Kansas: 300–326.

Shackleton, S.; Shackleton, C.; Shanley. P., eds. 2011. Nontimber forest products in the global context. Heidelberg, Germany: Springer-Verlag. 285 p.

Shaw, E.W. 1949. Minor forest products of the Pacific Northwest. Res. Note 59. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 10 p.

Sills, E.; Shanley, P.; Paumgarten, F. [and others]. 2011. Evolving perspectives on nontimber forest products. In: Shackleton, S.; Shackleton, C.; Shanley. P., eds. Nontimber forest products in the global context. Heidelberg, Germany: Springer-Verlag: 22–51.

Small, E. 2014. Blossoming treasures of biodiversity–44. Saguaro—threatened monarch of the desert. Biodiversity. 15: 39–53.

Smith, C.; Morissette, J.; Forest, S. [and others]. 2007. Synthesis of technical information on forest wetlands in Canada. Tech. Bull. 938. Edmonton, AB: National Council for Air and Stream Improvement. 97 p.

Sparling, D.W. 2014. Natural resource administration: Wildlife, fisheries, forests and parks. Waltham, MA: Academic Press. 374 p.

Staudinger, M.D.; Carter, S.L.; Cross, M.S. [and others]. 2013. Biodiversity in a changing climate: a synthesis of current and projected trends in the US. Frontiers in Ecology and the Environment. 11: 465–473.

Stein, B.A.; Gravuer, K. 2008. Hidden in plain sight: the role of plants in state wildlife action plans. Arlington, VA: NatureServe. 27 p. http://www.natureserve.org/sites/default/files/publications/files/hidden_in_plain_sight_0.pdf. [Date accessed: August 10, 2017].

Thornton, B. 2008. How many saquaros. Cactus and Succulent Journal. 80(4): 160–169.

Tidwell, T.; Karr-Colque, C. 2012. U.S. National report to the tenth session of the United Nations forum on forests. Washington, DC: U.S. Department of Agriculture, Forest Service. 18 p. www.un.org/esa/forests/pdf/national_reports/unff10/USA.pdf. [Date accessed: August 10, 2017].

Trask, H.K. 1991. Natives and anthropologists: the colonial struggle. In: Welsch, R.; Endicott, K. Taking sides: clashing views on controversial issues in anthropology. 3rd ed. New York: McGraw-Hill/Dushkin: 225–230.

Tribal Forest Protection Act (TFPA) of 2004; 25 USC 3101 note.

United Nations (UN). 1992. Convention on biological diversity. New York: United Nations. 28 p.

United Nations (UN). 2014. Multilateral treaties deposited with the Secretary-General. New York: United Nations. https://treaties.un.org/Pages/ParticipationStatus.aspx. [Date accessed: December 17, 2014].

United Nations Educational, Scientific and Cultural Organization (UNESCO). 1971. Convention on wetlands of international importance especially as waterfowl habitat. Netherlands: Ramsar Convention Secretariat. http://www.ramsar.org/sites/default/files/documents/library/original_1971_convention_e.pdf. [Date accessed: August 10, 2017].

United Nations Environment Programme–World Conservation Monitoring Centre (UNEP-WCMC). 2014a. The checklist of CITES species. Geneva, Switzerland: CITES Secretariat. http://checklist.cites.org. [Date accessed: August 10, 2017].

United Nations Environment Programme–World Conservation Monitoring Centre (UNEP-WCMC). 2014b. UNEP-WCMC trade database. Cambridge, UK: UNEP-WCMC. http://trade.cites.org/. [Date accessed: August 10, 2017].

University of Minnesota Extension. 2013. Minnesota harvester handbook. St. Paul: University of Minnesota, Extension Service. 118 p. http://www.extension.umn.edu/environment/trees-woodlands/minnesota-harvester-handbook/. [Date accessed: August 10, 2017].

U.S. Army Environmental Command (USAEC). 2015. Resources–army conservation reimbursable programs. Fort Sam Houston, TX: U.S. Army Environmental Command. https://www.aec.army.mil/index.php?cID=366. [Date accessed: August 10, 2017].

U.S. Commission on Civil Rights (US CCR). 2003. Not in my backyard: Executive Order 12898 and Title VI as tools for achieving environmental justice. Washington, DC: U.S. CCR. 185 p.

U.S. Department of Agriculture (USDA). 1994. Record of decision: Sierra Nevada Forest Plan Amendment—Final Supplemental Environmental Impact Statement. Washington, DC: USDA. 72 p. http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev3_046095.pdf. [Date accessed: August 10, 2017].

U.S. Department of Agriculture (USDA). 2009. USDA action plan for tribal consultation and collaboration. Washington, DC: USDA. 9 p. https://www.usda.gov/sites/default/files/documents/ConsultationPlan.pdf. [Date accessed: August 10, 2017].

U.S. Department of Agriculture (USDA). Environmental Justice Action Plan: 2012–2014. Washington, DC: USDA. http://www.dm.usda.gov/hmmd/FinalUSDAEJSTRATScan_1.pdf. [Date accessed: August 10, 2017].

USDA Forest Service. 1928. The national forest manual: regulations and instructions. Washington, DC: U.S. Department of Agriculture, Forest Service. 91 p.

USDA Forest Service. 1997. Forest Service handbooks. Washington, DC. https://www.fs.fed.us/im/directives/dughtml/fsh_5000.html. [Date accessed: July 25, 2017].

USDA Forest Service. 2001. National strategy for special forest products. FS-713. 15 p.

USDA Forest Service. 2002. Forest Service manual 2400—timber management, Chapter 2460—uses of timber other than commercial timber sales. Amendment No. 2400-2002-2. Washington, DC. 21 p.

USDA Forest Service. 2008. Timber sale preparation handbook; Chapter 80—uses of timber other than commercial timber sales. Amendment No. 2409.18-2008-1. Washington, DC.

USDA Forest Service. 2009. Forest Service manual—timber management, chapter—zero Code. Amendment No. 2400–2009-2. Washington, DC. 28 p.

USDA Forest Service. 2014. Willamette National Forest. https://www.fs.usda.gov/willamette. [Date accessed: August 10, 2017].

USDA Forest Service. 2015a. About the agency. http://www.fs.fed.us/about-agency. [Date accessed: August 10, 2017].

USDA Forest Service. 2015b. Timber sale preparation handbook; Chapter 80—uses of timber other than commercial timber sales, special forest products—forest botanical products. Interim Directive No. 2409.18-2015-1. Washington, DC.

USDA Forest Service. 2017. Timber sale preparation handbook; Chapter 80—Uses of Timber Other Than Commercial Timber Sales. Amendment No. 2409.18-2017-1. Washington, DC. https://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?2409.18. [Date accessed: August 10, 2017].

U.S. International Trade Commission. 1991. International trade agreements to protect the environment and wildlife: report to the Committee on Finance, United States Senate, on investigation no. 332-287 under section 332 of the Tariff Act of 1930. Washington, DC: U.S. International Trade Commission. 154 p.

Utah Department of Natural Resources (UT DNR). 2010. Utah statewide forest resource assessment & strategy guide. 76 p. http://www.ffsl.utah.gov/images/forestry/stateassessment/UtahStateAssessmentStrategy-FinalLowRes.pdf. [Date accessed: August 10, 2017].

Vance, N.C.; Borsting, M.; Pilz, D.; Freed, J. 2001. Special forests products: species information guide for the Pacific Northwest. Gen. Tech. Rep. PNW-GTR-513. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 169 p.

Vaughan, R.C., Munsell, J.F.; Chamberlain, J.L. 2013. Opportunities for enhancing nontimber forest products management in the United States. Journal of Forestry. 111(1): 26–33. http://nac.unl.edu/documents/morepublications/NTFP_Jnl-For_Jan-2013.pdf. [Date accessed: September 23, 2014].

von Hagen, B.; Weigand, J.F.; McLain, R. [and others]. 1996. Conservation and development of nontimber forest products in the Pacific Northwest: an annotated bibliography. Gen. Tech. Rep. PNW-GTR-375. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 246 p.

Washington Department of Natural Resources (WA DNR). 2013. 2013 annual report. http://issuu.com/wadnr/docs/dnr-2013-annual-report. [Date accessed: August 10, 2017].

Washington Department of Natural Resources (WA DNR). 2017. Forest Practices Board. http://www.dnr.wa.gov/about/boards-and-councils/forest-practices-board. [Date accessed: August 10, 2017].

Washington State Legislature. 2015. Chapter 76.48 RCW: specialized forest products. http://apps.leg.wa.gov/RCW/default.aspx?cite=76.48. [Date accessed: August 10, 2017].

Weigand, J. 2002d. Case study. The American Southwest. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber forest products in the United States. Lawrence, KS: University Press of Kansas: 65–74.

Weigand, J. 2002a. Case study. California. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber forest products in the United States. Lawrence, KS: University Press of Kansas: 81–86.

Weigand, J. 2002e. Case study. The Caribbean Basin: Florida, Puerto Rico, and the U.S. Virgin Islands. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber forest products in the United States. Lawrence, KS: University Press of Kansas: 75–80.

Weigand, J. 2002b. Case study. Culture and nontimber forest products in the American Pacific tropics. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber forest products in the United States. Lawrence, KS: University Press of Kansas: 87–95.

Weigand, J. 2002c. Case study. Overview of cultural traditions, economic trends, and key species in nontimber forest products of the Pacific Northwest. In: Jones, E.T.; McLain, R.; Weigand, J., eds. Nontimber forest products in the United States. Lawrence, KS: University Press of Kansas: 57–64.

West, J.M.; Julius, S.H.; Kareiva, P. [and others]. 2009. U.S. natural resources and climate change: concepts and approaches for management adaptation. Environmental Management. 44: 1001–1021.

West, M.B. 1992. Natural resources development on Indian reservations: overview of tribal, state, and federal jurisdiction. American Indian Law Review. 17(1): 71–98.

White, S.; Danielsen, K.C. 2002. Threats to wild plants in the ceded territories. Odanah, WI: Great Lakes Indian Fish and Wildlife Commission. 64 p. https://data.glifwc.org/archive.bio/Project%20Report%2002-01.pdf. [Date accessed: August 10, 2017.]

Whyte, K.P. 2014. Justice forward: tribes, climate adaptation and responsibility. In: Maldonado, J.K.; Colombi, B.; Pandya, R., eds. Climate change and indigenous peoples in the United States: impacts, experiences and actions. New York: Springer: 9–22.

Wijnstekers, W. 2011. The evolution of CITES. 9th ed. Budapest: International Council for Game and Wildlife Conservation. 937 p. http://www.cites.org/common/resources/Evolution_of_CITES_9.pdf. [Date accessed: August 10, 2017].

Wood, M.C. 1995. Protecting the attributes of native sovereignty: a new trust paradigm for Federal actions affecting tribal lands and resources. Utah Law Review. 109: 111-139.

Workman, S. 2014. ForWarn chosen for national climate resilience toolkit launched for White House. CompassLive Blog. USDA-Southern Research Station. https://www.srs.fs.usda.gov/compass/2014/11/19/forwarn-chosen-for-national-climate-resilience-toolkit-launched-for-white-house/. [Date accessed: August 10, 2017].

Wyler, L.S.; Sheikh, P.A. 2013. International illegal trade in wildlife: threats and U.S. policy. Washington, DC: Congressional Research Service. https://www.everycrsreport.com/files/20130723_RL34395_a407792bf33debc34c6516538db405e8eed1e6b3.pdf. [Date accessed: August 10, 2017].

Wynberg, R.P.; Laird, S.A. 2007. Less is often more: governance of a nontimber forest product, marula (*Sclerocarya birrea* subsp. caffra) in southern Africa. International Forestry Review. 9(1): 475–490.

Young, B.E.; Dubois, N.S.; Rowland, E.L. 2014. Using the climate change vulnerability index to inform adaptation planning: lessons, innovations, and next steps. Wildlife Society Bulletin. 39(1):174–181.