United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington, D.C. 20240

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To: Chief, Division of Management Authority

From: Chief, Division of Scientific Authority Rosemarie Gnam

Subject: Advice for the export of roots of wild and wild-simulated American ginseng (*Panax quinquefolius*) lawfully harvested during the 2011 harvest season in 19 States

The Division of Scientific Authority (DSA) has determined that the export of wild and wild-simulated American ginseng (*Panax quinquefolius* L.), listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), lawfully harvested during the 2011 harvest season in: Alabama, Arkansas, Georgia, Illinois, Indiana, Iowa, Kentucky, Maryland, Minnesota, Missouri, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin will not be detrimental to the survival of the species, provided the following **CONDITION** is implement:

> All wild and wild-simulated American ginseng roots for export must be 5 years of age or older (i.e., 4 or more stem scars present on the rhizome). The age of ginseng plants can be determined by counting the number of stem scars present on the rhizome. Except for the first year of growth as a seedling, a scar is produced on the rhizome from the abscission of the aerial stem. Plants with at least 3 leaves at the time of harvest are most likely to be at least 5 years old.

Wild-simulated roots have wild-like characteristics and, therefore, are virtually indistinguishable from roots of wild American ginseng plants. The harvest amounts annually reported by most States as "wild" are most likely a mixture of wild and wild-simulated roots. Because of this, we remain concerned about our inability to quantify the amount of wild-simulated ginseng reported as "wild" and our ability to assess the impact of harvest on wild American ginseng.

In this finding, we note efforts to improve regulation and management of American ginseng at the State and Federal level. Kentucky, Maryland, and North Carolina amended their harvest season start date to September 1, and the USDA Forest Service Monongahela and Wayne National Forests have implemented a harvest permit system based on estimated population sizes. In addition, Georgia, Pennsylvania, Tennessee, and Virginia are working on amending their harvest regulations.

Although we are able to make the current non-detriment finding, our ability to find non-detriment in 2012 is dependent upon improvements in the regulation and management of American ginseng. Therefore, we will continue to monitor the status of American ginseng and work with stakeholders, and will amend our finding in 2012 to ensure that it is inclusive of the most current information.

Basis for advice:

1. This finding is based on our review of the State harvest reports, information from other Federal agencies and industry, available scientific and commercial information including published and unpublished sources, and indirect information about the status and trade of the species. We make this finding on a State-by-State basis.

CITES Appendix-II listing of American ginseng

2. In the United States, wild American ginseng roots have been harvested for international trade for over 250 years (Carlson 1986; Nash 1895; Pritts 1995). On July 1, 1975, the species was included in Appendix II of CITES. The listing covers the export whole live or dead plants, whole and sliced roots, and parts of roots (including root fibers). In 1999, to further protect wild populations, we determined that only wild ginseng roots of 5 years of age or older may be exported. More specimens of American ginseng are exported from the United States than any other native plant species listed under CITES that is harvested from the wild.

Distribution, habitat, and biology of American ginseng

3. American ginseng is a slow growing herbaceous perennial plant native to deciduous forests of eastern United States and southern Canada (Ontario and Quebec) (Anderson et al. 1993; Kartesz 2011; McGraw et al. 2003). The species is reported to occur in thousands of small populations, typically fewer than 200 plants (Carpenter and Cottam 1982; Charron and Gagnon 1991; Farrington et al. 2008; Lewis 1988; and Furedi 2005; Schlessman 1985; Van der Voot 1998) that are widely distributed in forest habitats at various aspects and elevations (McGraw et al. 2003; Thatcher et al. 2006; Young and van Manen 2009). Because populations are widely dispersed over a relative large geographical area, many populations are not harvested in a given year (McGraw et al. 2010). Suitable, but unoccupied habitat exists throughout most of the species' range (McGraw 2001; Thatcher et al. 2006; van Manen et al. 2005; Young and van Manen 2009).

4. American ginseng is an obligate understory species adapted to low light levels (Anderson et al. 1993). The lifespan of American ginseng is unknown, though wild plants are known to live for more than 30 years (Charron and Gagnon 1991; McGraw 2001; Mooney and McGraw 2009). However, demographic field studies rarely find plants older than 20 years of age (Carpenter and Cottam 1982; Lewis and Zenger 1982; Mooney and McGraw 2009). Growth rates of individual plants vary due to biotic and abiotic factors (e.g., genetics, habitat quality, and environmental conditions), which can result in plants of the same size and numbers of leaves but not identical in age (Anderson et al. 1984, 1993; Carpenter and Cottam 1982; Lewis and Zenger 1982; McGraw et al. 2010).

5. Plants produce one stem (i.e., sympodium) in the spring, which can have between one and four palmately compound leaves arranged in a whorl. Leaves are commonly referred to as "prongs" (e.g., a 3-leaved plant is 3-prongs or 3-pronger). Plants can produce the same number of leaves for years (e.g., 1-, 2- or 3-leaves) or decrease or increase the number of leaves produced (Charron and Gagnon 1991; Farrington et al. 2009; McGraw and Furedi 2005). However, if defoliation occurs during the growing season, new leaves are not formed because the species is determinate in growth (Carpenter and Cottam 1982).

6. American ginseng is classified into growth stage classes based on the number of leaves: seedlings (1-compound leaf); juvenile plants (2-compound leaves); and adult plants (3- and 4-compound leaves) (Charron and Gagnon 1991; Lewis and Zenger 1982; McGraw and Furedi 2005). Plants can remain at the 1-leaf stage for several years before growing into a 2-leaf plant. Although 2-leaf plants often flower and are pollen donors, such plants rarely produce seeds in the wild (Anderson et al. 1984; Carpenter and Cottam 1982). Adult plants are considered reproductive, with larger plants producing more fruits than smaller plants (Anderson 2009; Anderson et al. 1993; McGraw and Furedi 2005; Schlessman 1987; Van der Voot and McGraw 2006).

7. The species is reported to have a long pre-reproductive period of at least 3 to 8 years (Anderson et al. 1993; Carpenter and Cottam 1982; Charron and Gagnon 1991; Lewis and Zenger 1982; Schlessman 1987). Results of a long-term demographic study of 30 populations in seven States (IN, KY, MD, NY, PA, VA, and WV) found the vast majority of 3-leaved plants produced flowers, but did not always produce fruits in any given year (McGraw et al. 2010). In a separate study, adult plants with flowers or fruits ranged between 10% and 56% of the populations in the study (Cruse-Sanders et al. 2005). McGraw et al. (2010) followed the fates of 519 newly-germinated seedlings in 23 of the 30 populations for five years. Their findings showed that only 7.3% (11 of the 150 plants) of the surviving seedlings had produce any seeds by age five (i.e., rhizome with 5 stem scars), and that 92.7% (139 of 150 plants) of the five-year old plants only produced one or two leaves.

8. The plant's rhizome is characterized by permanent scars formed by the annual abscission of the aerial stem (Anderson et al. 1993; Charron and Gagnon 1991; Lewis and Zenger 1982). The stem scars can be counted to determine the age of a plant (Anderson et al. 1993; Schlessman 1987). The first year's growth as a seedling is marked at the root collar where the rhizome and the root connect (Anderson et al. 1993; Carpenter and Cottam 1982; Lewis and Zenger 1982). Unlike many other native rhizomatous plant species (e.g., *Hydrastis canadensis*), American ginseng does not reproduce vegetatively (i.e., asexual reproduction).

9. Flowers of American ginseng can cross-pollinate via halictid bees and syrphid flies and can self-pollinate (Carpenter and Cottam 1982; Lewis and Zenger 1983; Schlessman 1985). Findings from genetic studies show low genetic variation within ginseng populations and high variation among populations, indicating a high degree of self-pollination is occurring (Cruse-Sanders and Hamrick 2004a; Cruse-Sanders et al. 2005; Grubbs and Case 2004).

10. An individual flower can develop 1–3-seeded fruits (i.e., drupe) (Gleason and Cronquist 1963; Radford et al. 1981) that turn green to bright red at maturity by late summer (McGraw et al. 2005). The bright red color of the fruit suggests that it might be dispersed by birds (Lewis and Zenger 1982). However, findings from field studies shows dispersal of fruits is passive with most seeds found within 2 meters (6.5 feet) of parent plants (Anderson et al. 1984 and 1993; Cruse-Sanders and Hamrick 2004; Lewis and Zenger 1982; Van der Voort and McGraw 2006). The species exhibits low fecundity and high seed mortality (Carpenter and Cottam 1982; Charron and Gagnon 1991; Lewis and Zenger 1982; Schlessman 1985). Field studies indicate that populations do not form persistent seed banks of more than 4-5 years (Anderson et al. 1984 and 1993; Charron and Gagnon 1991; Lewis 1988; Van der Voort 2005), and that seed viability decrease over time (Van der Voort 2005).

11. Reproduction is by seeds (Charron and Gagnon 1991; Lewis and Zenger 1982). Seeds exhibit

morphophysiological dormancy (Baskin and Baskin 1998), which results in an 18-20 month dormancy period before seeds germinate (Anderson et al. 1993; Charron and Gagnon 1991; Lewis and Zenger 1982). Seedling establishment appears to be the most vulnerable stage of the species' life cycle (Charron and Gagnon 1991).

Genetic information of American ginseng

12. Today, American ginseng occurs in thousands of small populations that are widely distributed in (McGraw et al. 2003, 2010; Thatcher et al. 2006; Young and van Manen 2009). Because most populations are small and isolated by distance, there is less gene exchange resulting in less genetic diversity (Cruse-Sanders and Hamrick 2004a; Cruse-Sanders and Hamrick 2004a; Cruse-Sanders et al. 2005). Such populations can experience genetic drift (i.e., loss of alleles) and inbreeding (Cruse-Sanders and Hamrick 2004a, 2004b, 2005; Grubbs and Case 2004; Mooney and McGraw 2007a; Anderson and Loew 2009). Small populations of American ginseng may also be vulnerable to the Allee effect (e.g., reproductive limitation due to small population size) (Hackney and McGraw 2001).

13. Findings of genetic research of wild American ginseng populations reveal genetic diversity (i.e., heterozygosity) within populations is low, indicating closely related individuals (i.e., inbreeding), and that genetic diversity is high among populations indicating there could be isolation by distance (Cruse-Sanders and Hamrick 2004a; Cruse-Sanders et al. 2005; Grubbs and Case 2004). Furthermore, populations in protected areas (i.e., harvest is not allowed) had significantly higher levels of genetic diversity than populations (i.e., unprotected) where harvest is allowed, and that the unprotected populations had significantly higher levels of genetic structure (i.e., fixation of alleles) (Cruse-Sanders and Hamrick 2004a). Increase in genetic structure could be the result of reduced population sizes due to habitat disturbance and/or harvesting (Cruse-Sanders and Hamrick 2004a). Researchers also found that the harvest of adult plants reduced within-population genetic diversity within one generation (Cruse-Sanders et al. 2005).

14. Genetic diversity is necessary for adaptation to environmental changes and the long-term persistence of populations and species (Cruse-Sanders and Hamrick 2004a; Grubbs and Case 2004; Mooney and McGraw 2007a; Souther 2011). Of particular interest are recent research findings that suggest American ginseng populations are adapted to local temperature conditions (Souther and McGraw 2011) and that this adaptation is most likely genetically based (Souther 2011).

15. When selective harvest targets heritable traits, harvest can lead to evolutionary changes in species (Cruse-Sanders and Hamrick 2004a; Law 2001; Stockwell et al. 2003; Mooney and McGraw 2007b, 2009). Scientific findings show that harvest pressure affects the reproductive potential of populations by selecting the largest and presumably most reproductive plants, which over time has resulted in a reduction in the overall size of ginseng plants (Case et al. 2007; McGraw 2001; Mooney and McGraw 2009b).

16. Researchers have identified genetic distinctions between wild American ginseng and cultivated plants, and that wild populations have greater genetic diversity than cultivated plants (Boehm et al. 1999; Grubbs and Case 2004; Lim 2004; Schlag 2004; Schluter and Punja 2002). Cultivated genotypes are more similar in composition to each other than genotypes of wild populations (Grubbs and Case 2004). Planting seeds produced by non-local cultivated plants into wild populations may

affect fitness within wild populations by introducing genotypes that are not adapted to local environmental conditions (Grubbs and Case 2004; Mooney and McGraw 2007a, 2007b; Souther 2011). Over time, cultivated genotypes could affect locally-adapted wild genotypes, causing a breakup of locally adapted gene complexes, which could affect the long-term viability of the species (Anderson et al. 2002; Grubbs and Case 2004; McGraw *in litt*. 2004; Mooney and McGraw 2007a; Schlag 2004).

Threats to American ginseng populations

17. The main threats to American ginseng are: illegal harvest (McGraw and Furedi 2005; McGraw et al. 2010; Van der Voort and McGraw 2006); irresponsible harvest (Farrington et al. 2009; McGraw et al. 2010; Mooney and McGraw 2009; Van der Voort and McGraw 2006); herbivory by white tail deer (*Odocoileus virginianus*) (Farrington et al. 2009; McGraw and Furedi 2005); and invasive plant species (Wixted and McGraw 2010). Habitat loss and destruction also threatens the species in certain areas of its range (Charron and Gagnon 1991; NatureServe 2005).

18. As a result of illegal harvest of American ginseng on National Park Service lands and USDA-Forest Service lands, these agencies frequently mark roots with permanent markers (e.g., DNA markers, coded chips) to protect them from harvest and to identify marked roots in the supply chain.

19. Numerous States reported American ginseng-related violations over the past two years, which included poaching on private and public lands, harvest during closed season, and harvest of under aged roots. A two year undercover investigation in Indiana resulted in the seizure of hundreds of pounds of illegally-harvested ginseng roots. As a result of the investigation and the illegal activities uncovered, the Indiana Department of Natural Resources (IDNR) proposed revised regulations for American ginseng (Indian Ginseng Report 2010-2011). Although the bill failed to pass the State legislation in 2011, the IDNR plans to submit regulatory changes during the 2012 legislative session. We note the efforts of State and Federal law enforcement officials, particularly in the past several years, have played an important role in supporting the sustainable harvest of American ginseng.

State management of American ginseng

20. With the exception of populations of American ginseng on Federal lands (e.g., USDA Forest Service, National Park Service), the management of American ginseng is the responsibility of State governments. The species occurs in 34 States, of which 19 States (Alabama, Arkansas, Georgia, Illinois, Indiana, Iowa, Kentucky, Maryland, Minnesota, Missouri, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin) meet the requirements of the U.S. Fish and Wildlife Service (Service) CITES Export Program for wild American ginseng outlined in 50 CFR § 23.68. The 19 States manage the species through codified laws and regulations for the harvest and sale of American ginseng within their respective jurisdictions. State approval by the Service does not include a non-detriment finding. Non-detriment findings are made annually or multi-annually on a State-by-State basis in order to assess the status of American ginseng and the effects of harvest of roots for export through time.

21. Of the 19 States, American ginseng is ranked as apparently secure in five States, vulnerable in 13 States, and unranked in one State (Table 1). The other 15 States prohibit the harvest of wild roots or discourage harvest due to the status of the species in the State (Table 1). The overall conservation

ranking of American ginseng in the United States is vulnerable/apparently secure (NatureServe 2005). Five of the 15 States list American ginseng as endangered or threatened due to its rarity, whereas nine States list it as a species of concern. Only one of the 15 States has no formal ranking for the species.

22. Eighteen of the approved States have promulgated regulations that include a minimum harvest size and/or age restriction (e.g., plants must have 3-4-leaves and/or 5 years of age), and require seeds of harvested plants to be planted near or in the vicinity of harvested plants (Table 2). Virginia does not yet have size or age limit harvest restrictions in its regulations, though it does recommend that diggers harvest only plants with 3-leaves and are 5 years of age. Officials from the State recently informed us that it is in the process of revising its regulations to include harvest requirements. Nevertheless, it is the State's responsible to certify that all wild-harvested ginseng roots for export are 5 years of age.

23. Results from field studies and simulations studies indicate that when diggers fully comply with States regulations that prohibit harvest of roots before August 31 to ensure that fruits are ripe at the time of harvest, restrict harvest to 3-leaf plants, and require seeds of harvested plants to be planted back into the population, preferable at a depth of 2 cm (ca. 1 inch), population growth can occur (Farrington et al. 2009; Van der Voort and McGraw 2006).

24. Fifteen of the 19 States prohibit the harvest of American ginseng on State lands, whereas four States limit harvest to certain public lands and require diggers to obtain State issued permits prior to harvest. Most States require diggers to obtain landowners' permission to harvest ginseng on private lands not their own. Only six States issue permits or licenses to harvest wild American ginseng (Table 2). At the last Federal – State meeting on American ginseng in February 2009, the States that issue harvest licenses reported that licensing systems provide greater accountability and transparency, discourage illegal harvest, and improve the amount and quality of information available on the status of ginseng.

25. All 19 States provide educational outreach materials (e.g., Web pages, handouts) which include information about State laws and regulations for the harvest, selling, and buying of American ginseng, as well as information about CITES and the Service's role in the export of ginseng. Many States also provide useful information about good stewardship harvest practices (e.g., not to over-harvest, collect roots from large populations, plant seeds of harvested plants). In addition, many States, as well as the FWS's International Web site, provide a link to the American Herbal Products Association's Web site, where a one-page pamphlet for each of the 19 States can be downloaded. The pamphlets include State harvest regulations and good stewardship harvest practices.

26. We are encouraged that several States track and report separately the harvest amounts of wild-simulated roots and wild roots. Although most States report that they do not have a mechanism or regulations in place to track and report wild-simulated roots and wild roots separately, we continue to be interested in the development of reliable mechanisms for reporting the amounts separately to better inform our findings related to non-detriment.

New information on State regulation of harvest

27. Prior to the start of the 2010 harvest season, Maryland amended its harvest season start date

from August 20 to September 1. As of January 3, 2011, North Carolina amended its harvest regulations to prohibit harvest outside the harvest season of September 1 to December 31 (formerly April 1). Additionally, effective August 2, 2011, Kentucky amended its harvest season start date from August 15 to September 1.

28. Since the issuance of our last non-detrimental finding, we contacted agency officials in seven States (i.e., Georgia, Kentucky, North Carolina, Pennsylvania, Tennessee, Vermont, and Virginia) about our concerns with the States' regulations for ginseng harvest, in particular the harvest season start dates in August. As previously reported, Kentucky and North Carolina amended its harvest regulations, whereas, Georgia, Pennsylvania, Tennessee, and Virginia are working on amending their regulations before the 2012 harvest season. Agency officials in Vermont reported that due to funding limitations, the State did not currently have the resources to amend its harvest regulations. We will continue to work with Vermont so that we can be assured the harvest season start date is based on the most accurate biological information.

29. As reported in previous findings, research findings show there is no biological basis for most State-to-State differences in harvest season start dates (McGraw et al. 2005), and that the harvest of plants with unripe fruits (i.e., green in color) can negatively affect recruitment and population growth (Van der Voort and McGraw 2006). In addition, States with harvest start dates in August significantly decrease the effectiveness of diggers planting seeds, thereby offsetting the positive effect of seed planting on population growth (McGraw et al. 2005; Van der Voort and McGraw 2006).

USDA Forest Service management of American Ginseng

30. The U.S. Department of Agriculture-Forest Service is responsible for the viability of American ginseng and its habitat on National Forest lands. According to Forest Service regulations and directives (36 CFR 223.219; FSH 2409.18_87.1), National Forests are required to determine sustainable harvest levels of all native plants sold as 'special forests products' (e.g., non-timber forest products), including American ginseng. With the exception of Maryland, the 18 States that allow harvest have Forest Service lands within their State boundaries.

31. Forest Service botanical staff have expressed concerned about poaching of American ginseng on National Forest lands (Kauffman 2006). As reported in pervious findings, we continue to see a strong relationship between the counties where ginseng is reported to be harvested and proximity to National Forest lands. This is a concern where harvest is prohibited on National Forest lands.

32. In the Eastern Region (R9) of the Forest Service, American ginseng occurs on 13 National Forests in 12 States (Illinois, Indiana, Maine, Michigan, Missouri, New Hampshire, New York, Ohio, Pennsylvania, Vermont, West Virginia, and Wisconsin). Since 2000, American ginseng has been listed as "sensitive" on 10 of the 13 National Forests, meaning that the species is rare and harvest is prohibited except for approved purposes such as research. However, due to concerns about over-harvest and the decline of the species, many of the National Forests prohibited the harvest of ginseng years before it was officially listed as "sensitive" (Kauffman 2006). One National Forest does not allow harvest and the species is not listed as "sensitive." Only two National Forests (i.e., Monongahela NF in West Virginia and Wayne NF in Ohio) in the Region allow harvest through a new biologically-based permit system.

33. Since our last finding, the Monongahela National Forest (MNF) and Wayne National Forest (WNF) have amended their harvest permitting systems for American ginseng. Harvest permits are no longer issued based on maximum root weight (e.g., one pound of fresh weight), instead diggers are allowed to harvest up to 95- 3-leaf plants that are 5 years of age or older, and harvest is restricted to designated areas on the National Forests. To enforce this requirement, diggers are required to keep harvested plants intact until they are transported off the National Forests, and return a harvest reporting form (i.e., "Product Quantity Removal Record") complete with the number of plants harvested from the National Forest.

34. The total allowable harvest for the MNF is set at 36,300 individual plants (a total of 383 harvest permits/season) (C. Coon, pers. comm., 2011), and 22,230 individual plants for the WNF (a total of 234 harvest permits/season) (K. Karriker, pers. comm., 2011). The annual harvest amounts represent 5% of the estimated adult population of American ginseng, which is the amount of plants considered to be sustainably harvested on the National Forests (C. Coon and K. Karriker, pers. comm., 2011), as described below. The estimated population sizes used to calculate the harvest limits was extrapolated from published research by the U.S. Geological Survey (2005) and McGraw et al. (2003); both studies have been reported in detail in previous findings.

35. The 5% allowable harvest set by the MNF and WNF is based on published demographic studies of wild American ginseng and model simulations of harvester behavior patterns (Farrington et al. 2009; Nantel et al. 1996; Van der Voort and McGraw 2006), which have been reported in detail in previous findings. The findings from these studies suggest that an annual harvest rate of 5% might be sustainable if diggers comply with States' regulations that prohibit the harvest of roots before August 31, restrict harvest to 3-leaf plants, require fruit to be ripe (i.e., red in color) at the time of harvest, and require diggers to plant seeds at a depth of 2 cm (ca 1 inch) at the harvest site. The harvest regulations for Ohio and West Virginia include these requirements.

36. In 2007, the WNF established six long-term monitoring plots and included six additional plots in 2008. Sites are monitored annually and will be analyzed in 2012 to assess the status of American ginseng on the Forest and to determine whether further guidelines are necessary to ensure the long-term viability of American ginseng. The MNF has also established monitoring plots, though not all plots are censused annually.

37. In the Southern Region (R8) of the Forest Service, American ginseng is found on National Forests in 10 States (Alabama, Arkansas, Georgia, Kentucky, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, and Virginia). The species is not listed as "sensitive" in the Region, though harvest is prohibited on several National Forests due to concerns about the decline of the species (Kauffman 2006). Harvest is allowed through the issuance of permits on five National Forests in four States (Georgia, Kentucky, North Carolina, and Tennessee).

38. The five National Forests that allow harvest have set harvest permit based on weight limits and restrict harvest to designated areas on the National Forests. The National Forests follow State harvest regulations except the National Forests in Georgia and Kentucky. The Chattahoochee-Oconee National Forest in Georgia limits harvest to 3-leaf plants 10 years or older and the season starts September 1 instead of the August 15 date set by the State. The harvest season on the Daniel Boone National Forest in Kentucky also opens later than the State's harvest season and is limited to one month (September 15 to October 15 instead of September 1 (formerly August 15) to December

1). Only the National Forests in North Carolina (Nantahala and Pisgah) and Tennessee (Cherokee) have established long-term monitoring plots, though not all plots are censused annually.

Wild-simulated American Ginseng

39. Field cultivated American ginseng seeds that are intentionally planted in natural forest habitat is referred to as "wild-simulated" ginseng as the roots of such plants are visually indistinguishable from wild roots (Beyfuss 1999; and Jacobson 2008; Persons and Davis 2005). The harvest of wild-simulated ginseng provides economic opportunities and may alleviate harvest pressure on wild ginseng populations (Burkhart 2011; Burkhart and Jacobson 2008). However, the amount of wild-simulated roots harvested annually is unknown. Wild-simulated production methods are widely promoted through State extension offices, land-grant universities, local community organizations, and ginseng growers' associations. Commercially produced seeds from growing operations in Canada and the United States are readily available.

40. Private forest lands predominate the eastern and southern United States, with public forest lands (State and Federal lands) representing approximately 20% of the total forest area (USDA Forest Service 2002). Due to secretive nature of growing ginseng on private lands, little is known about the amount of wild-simulated ginseng grown on such lands. Although ginseng harvest is prohibited on most public forest lands, access to such lands is easy and planting (as well as harvest) of ginseng for future harvests occurs based on anecdotal information; however, the extent is unknown. McGuffin (2009) reported that ginseng dealers provide annually an estimated 6–17 million commercially produced ginseng seeds to diggers to plant in forest habitat.

41. We continue to investigate the risk to wild populations posed by the intentional planting of non-local commercially produced seeds on State and Federal lands, nature preserves and other conservation lands to allay or validate concerns about the genetic erosion and its effect on wild populations and the long-term viability of the species.

Harvest and export of American Ginseng from 2007 to 2010

42. In 2007, global and domestic prices for wild-harvested roots increased substantially resulting in a slight increase in the amount of roots harvested compared to the 2006 harvest (59,279 lbs. compared to 54,499 lbs.). In addition, some States reported that several wild-simulated growers took advantage of market prices and harvested their roots that year. The high prices paid in 2007 created additional harvest pressure in 2008, as diggers expected similar prices for wild roots. By late 2008, however, the global economy had significantly changed which affected the demand and price paid for wild-harvested roots. Consequently, many people held on to their roots expecting to get better prices in 2009. Following discussions with State ginseng coordinators in February 2009, we believe that as a result of the market fluctuations, the tabulated harvest amounts reported by number of States in 2008 did not reflect the actual amount of roots harvested in those States. Nevertheless, the total amount reported in 2008 (59,809 lbs.) was slightly more than the 2007 harvest total (59,279 lbs.).

43. The total harvest for 2009 (83,108 lbs.) was the largest annual harvest total reported since 1997, two years before the implementation of the 5-year rule (Figure 1). The 2009 total harvest exceeded the 10-year average by 28.3% (18,345 pounds). We suspect that the addition of hold-over roots

from 2008 does not fully explain such a large annual increase in harvest amounts. Based on anecdotal information, more people were harvested ginseng in 2009 than previous years. All States except four reported an increase in the total amount of ginseng harvested in 2009 compared to 2008.

44. Kentucky, which consistently has the largest annual harvest, and Tennessee with the second largest harvest in 2009, reported increases of 62.6% (7,414 lbs.) and 73.5% (6,207 lbs.), respectively, over the amounts reported in 2008. The harvest amounts reported for Kentucky and Tennessee were 21% (3,362 lbs.) and 67% (5,898 lbs.), respectively, over the 10-year harvest averages for these States.

45. Although the total harvest reported for 2010 (64,001 lbs.) was less than the 2009 harvest amount, it was more than the total harvest amounts from 2004 to 2008. For the second consecutive year, the harvest in Tennessee exceeded the 10-year average for the State. Of particular interest was the harvest total reported for Indiana, which was 31.6% less than the 10-year average for the State (3,447 lbs. compared to 5,040 lbs.). The reduction in harvest is likely a result of the law enforcement efforts in the State in 2010. Additionally, the average number of dry roots per pound reported by Indiana in 2010 was substantially higher than the 10-year average (528 roots/lb. compared to 386 roots/lb.), and was the largest number ever reported by a State. Anderson et al. (2002) have suggested that as the number of roots per unit weight increases, smaller plants are being harvested, which could indicate an increase intensity of harvest and declines in population sizes.

46. The average number of dry roots per pound reported for Kentucky in 2009 and 2010 were less than the 9-year average (the total records for the State) for the State (240 roots/lb. compared to 308 roots/lb.). North Carolina has annually reported a decrease in the average number of roots per pound since it began reporting root data in 2005; whereas, Tennessee, West Virginia, and Vermont annual averages have remained fairly consistent since 2005 (NC, TN, and WV have the largest annual harvests after Kentucky). Although the number of roots per pound reported for Tennessee has remained fairly consistent, the annual harvest amounts reported from 2005 to 2010 have increased.

47. Although methods used to calculate the number of roots per pound varies among the States that collect such data, and noting there are regional variations in root weights, these data provide trend information that we monitor annually in order to be aware of any irregularities that would be of concern. Figure 2 shows the average dry roots per pound of American ginseng reported by 14 States, from 2005 to 2010.

48. Despite the increase in the harvest amounts reported by most of 19 States for the past two harvest seasons, States reported that harvest levels are not impacting wild populations and that the status of the species is stable. Although harvest intensity can fluctuate in any given year, we believe it is important to pay particular attention to recent increases in harvest amounts reported. We will continue to monitor the status of American ginseng in the wild, and will assess whether further progress relating to harvest regulations have been made at the State and Federal level, as described in this finding, in making our finding for 2012.

Future actions

- We will continue to support efforts in Georgia, Indiana, Pennsylvania, Tennessee, and Virginia to amend their harvest regulations before the start of the 2012 harvest season. We

will continue to urge Vermont to initiate regulatory change to revise its harvest season start date to one that is biologically based.

- We will work with the States and industry to explore how to accurately report harvest amounts of wild-simulated roots separate from wild roots so that we can better assess the impact of harvest on wild populations and the status of the species.

- We will work with the USDA Forest Service-Southern Region to explore implementing a harvest permit system based on population estimates of American ginseng instead of the current weight based system being used.

- We will work with the USDA Forest Service to explore seed collection for *in situ* and *ex situ* conservation of American ginseng on National Forest lands.

Table 1. Status rankings of American ginseng (2006 and 2011). Changes in State rankings are in bold.

State	2006 Status rank[1]	2011 Status rank[1]	Classification under State law or regulation
Alabama	S4	S4	None
Arkansas	S4	S4	None
Connecticut	S3	S3	Special Concern
Delaware	S2	S2	Species of Conservation
District of Columbia	SH	SH	Historical (possibly extirpated)
Georgia	S3	S3	Special Concern
Illinois	S3?	S3?	None
Indiana	S3	S3	None
Iowa	S3	S3	None
Kansas	SNR	**S1**	None
Kentucky	S3S4	S3S4	None
Louisiana	S1	S1	Rare
Maine	S2	S3	Endangered
Maryland	S3	S3	Watch List
Massachusetts	S3	S3	Special Concern
Michigan	S2S3	S2S3	Threatened
Minnesota	S3	S3	Special Concern
Mississippi	S3	S3	Watch List
Missouri	S4	S4	None
Nebraska	S1	S1	Threatened
New Hampshire	S2	S2	Threatened
New Jersey	S2	S2	Species of Concern

State	2006 Status rank[1]	2011 Status rank[1]	Classification under State law or regulation
New York	S3S4	S3S4	Exploitable Vulnerable
North Carolina	S4	S4	Watch List /Special of Concern
Ohio	SNR	SNR	None
Oklahoma	S1	S1	Watch List
Pennsylvania	S4	S4	Vulnerable
Rhode Island	S1	S1	Endangered
South Carolina	S2/S3	**S4**	Rare
South Dakota	S1	S1	None
Tennessee	S3S4	S3S4	Special Concern, Commercially Exploited
Vermont	S2S3	**S3**	Watch List
Virginia	S3S4	S3S4	Watch List /Threatened
West Virginia	S3S4	S3S4	None
Wisconsin	S4	S4	None

[1] Explanation of NatureServe ranking system is the following. Critically imperiled (S1): Often 5 or fewer occurrences. Imperiled (S2): Very few populations, often 20 or fewer occurrences. Vulnerable (S3): Relatively few populations, often 80 or fewer. Apparently secure (S4): Uncommon but not rare; some cause for long-term concern due to declines or other factors. SNR: State conservation status not yet assessed. SH: Species occurred historically and there is some possibility that it may be rediscovered. Species reviewed on June 3, 2005. NatureServe Explorer: An online encyclopedia of life [web application], Arlington, Virginia. Retrieved from: http://www.natureserve.org/, February 28, 2006 and June 27, 2011. State ranking for CT, ME, MA, MI, NH, NY, NC, PA, RI, and TN: Retrieved from: http://plants.usda.gov/, June 27, 2011; State ranking for GA, NC, SC, and VA: URL Retrieved from: http://herbarium.unc.edu/weakleysflora.pdf, June 27, 2011.

Table 2. Current State regulations for American ginseng.

State	Harvest Season	Harvest permitted on State lands	Monitoring ginseng on State lands	Landowner permission required to harvest ginseng and/or State issued harvest license required	Minimum age and/or number of leaves (prongs); fruit maturity; and planting of seeds
Alabama	Sept 1–Dec 31 Harvest dates do not apply to ginseng harvested for personal use on land owned or managed by the collector.	Yes	No	Written permission required for private and public lands with certain exceptions. Diggers must register annually with the State.	3 prongs with ripe fruit. Seeds of harvested plants must be planted at harvest site.
Arkansas	Sept 1–Dec 1	No	No	Landowner's permission not required; harvest license not required.	3 leaves/prongs with red fruit. Seeds of harvested plants must be planted at harvest site.
Georgia	Aug 15–Dec 31	No	No	Landowner's permission required; harvest license/permit not required.	3 prongs and fruiting stalk present. Seeds of harvested plants must be planted at harvest site.
Illinois	First Saturday in Sept–Nov 1	No	No	Landowner's permission required; State-issued harvest permit is required.	10 years or older with 4 leaves. Seeds of harvested plants must be planted in the vicinity of parent plants.

State	Harvest Season	Harvest permitted on State lands	Monitoring ginseng on State lands	Landowner permission required to harvest ginseng and/or State issued harvest license required	Minimum age and/or number of leaves (prongs); fruit maturity; and planting of seeds
Indiana	Sept 1–Dec 31	No	No	Landowner's permission required; harvest license/permit not required.	3 prongs with a flowering or fruiting stalk present or 4 internodes on rhizome. Seeds of harvested plants must be planted in the vicinity of parent plants.
Iowa	Sept 1–Oct 31	No	No	Landowner's permission not required; State-issued harvest permit required.	3 prongs, stalk must be retained. Seeds of harvested plants must be planted within 100 feet (ft) of parent plants, and cannot be removed from harvest site.
Kentucky	Sept 1–Dec 1	No	Yes, long-term permanent plots.	Landowner's permission not required; harvest license/permit not required.	5 years and 3 or more prongs. Seeds of harvested plants must be planted within 50 ft of harvested plants.
Maryland	Sept 1–Dec 1	No- State parks; yes- in certain State forests.	Yes, ongoing	State recommends landowner's permission be obtained; State-issued harvest permit is required.	3 prongs with mature fruit (red). Seeds of harvested plants must be planted in the vicinity of harvested plants. Planting locally grown seed is recommended.

State	Harvest Season	Harvest permitted on State lands	Monitoring ginseng on State lands	Landowner permission required to harvest ginseng and/or State issued harvest license required	Minimum age and/or number of leaves (prongs); fruit maturity; and planting of seeds
Minnesota	Sept 1–Dec 31	No-State park lands; yes- certain State forest lands with permit.	No	Landowner's permission not required; harvest license/permit not required.	3 prongs with 15 leaflets. Seeds of harvested plants must be planted at or near harvest site.
Missouri	Sept 1–Dec 31	No	Yes, permanent plots	Property owner's permission must be obtained; harvest license/ permit not required.	3 prongs; seeds of harvested plants must be planted within 100 ft. of parent plants.
New York	Sept 1–Nov 30	No	No	Property owner's permission must be obtained; harvest license/ permit not required.	3 prongs with mature fruit. Seeds of harvested plants must be planted within 50 ft. of harvest.
North Carolina	Sept 1–Dec 31	No	Yes	Property owner's permission must be obtained in writing; harvest license/permit not required.	3 prongs or at least 4 bud scars plus a bud on the neck. Seeds of harvested plants must be planted within 100 ft. of harvest.
Ohio	Sept 1–Dec 31	No	Yes	Property owner's permission must be obtained in writing; harvest license/permit not required.	3 prongs; seeds of harvested plants must be planted at harvest site.

State	Harvest Season	Harvest permitted on State lands	Monitoring ginseng on State lands	Landowner permission required to harvest ginseng and/or State issued harvest license required	Minimum age and/or number of leaves (prongs); fruit maturity; and planting of seeds
Pennsylvania	Aug 1–Nov 30	No	Yes, ongoing	Property owner's permission must be obtained; harvest license/permit not required.	3 prongs with 15 leaflets and red fruit. Seeds of harvested plants must be planted in the vicinity of harvest site.
Tennessee	Aug 15–Dec 31	No on majority of State lands.	No	Property owner's permission must be obtained; harvest license/ permit not required.	3 prongs with mature fruit. Seeds of harvested plants must be planted at or near harvest site.
Vermont	Aug 20–Oct 10	No	No	Property owner's permission must be obtained; State-issued harvest permit is required.	5 prongs with mature fruit. Seeds of harvested plants must be planted in the vicinity of harvest site.
Virginia	Aug 15–Dec 31; except for private lands which can be harvested outside of season.	No	No	Property owner's permission must be obtained; harvest license/permit not required.	No harvest regulations. State recommends 4 prongs with red fruit and planting of seeds of harvested plants at harvest site.
West Virginia	Sept 1–Nov 30	No	Yes, ongoing	Property owner's permission must be obtained in writing; harvest license/permit not required.	3 prongs with 15 leaflets and red fruit. Seeds of harvested plants must be planted at harvest site.

State	Harvest Season	Harvest permitted on State lands	Monitoring ginseng on State lands	Landowner permission required to harvest ginseng and/or State issued harvest license required	Minimum age and/or number of leaves (prongs); fruit maturity; and planting of seeds
Wisconsin	Sept 1–Nov 1	No	Not currently	Property owner's permission must be obtained; State-issued harvest permit is required.	3 or more true leaves with a flowering/fruit stalk. Seeds of harvested plants must be planted near parent plants.

Figure 1: Annual harvest and exports of wild roots and wild-simulated roots of American ginseng.

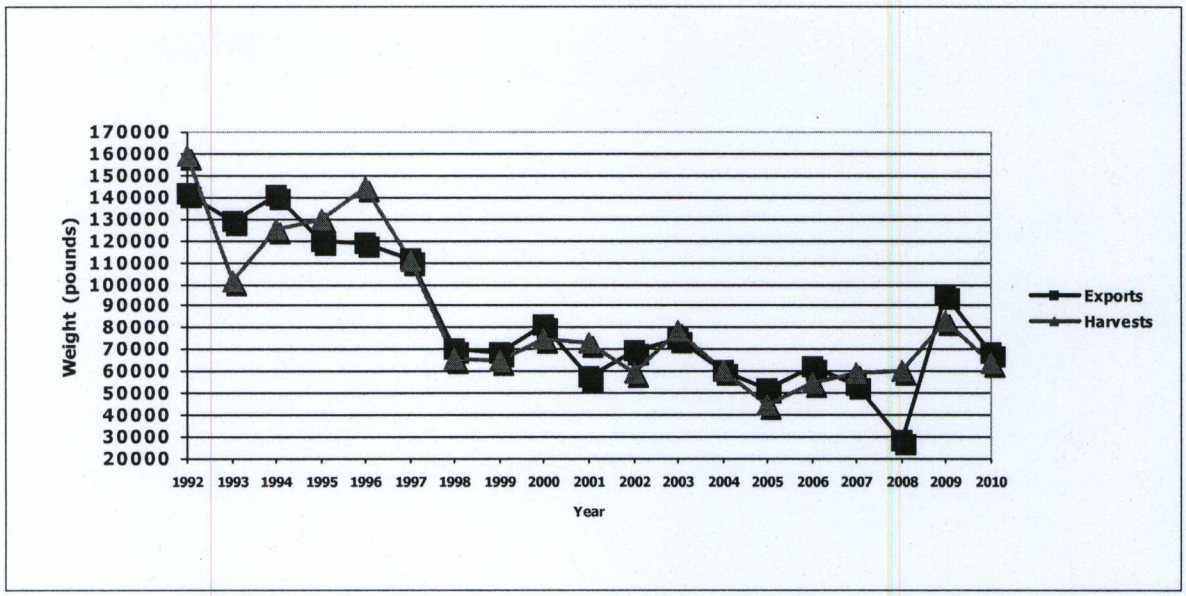
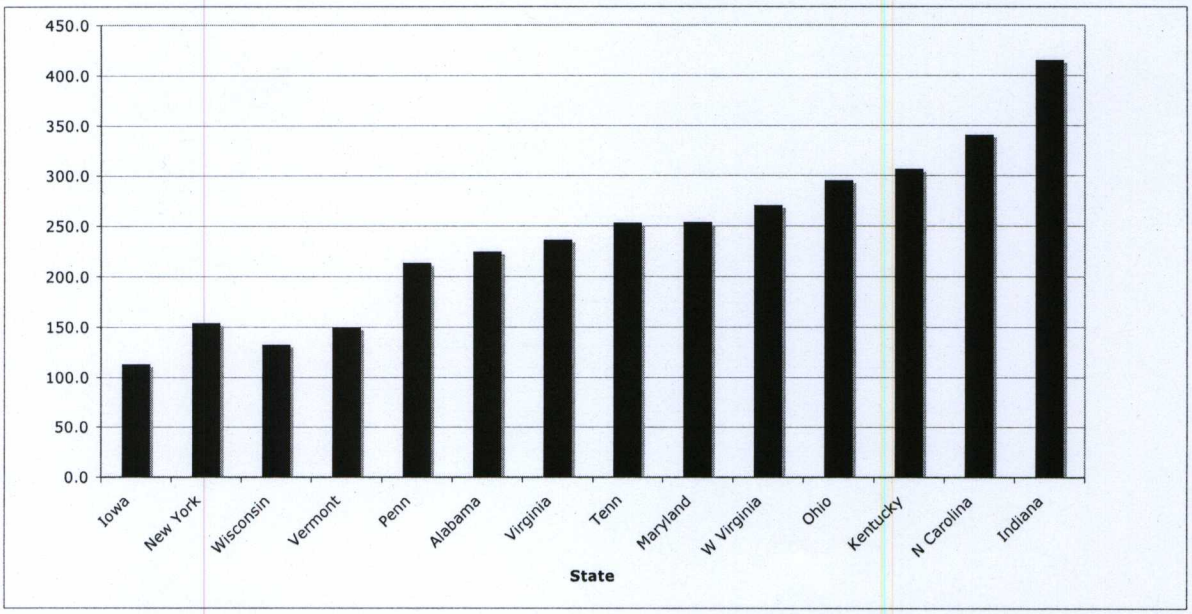


Figure 2: Averages dry roots of American ginseng per pound (2005 to 2010).



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