

August 5, 2003

To: Chief, Division of Management Authority
From: Chief, Division of Scientific Authority
Subject: Convention Permit Applications for Wild Ginseng (*Panax quinquefolius*) Harvested in 2003 and 2004

This document constitutes our finding on the export of wild American ginseng, *Panax quinquefolius*, for the 2003 and 2004 harvest seasons.

Please, be advised that, based on our analysis of available information, we find that the export of **wild** American ginseng roots of **5 years of age or older** (i.e., with five or more bud-scale scars on the rhizome) harvested during the 2003-2004 seasons in the following States **will not be detrimental to the survival of the species**: Alabama, Arkansas, Georgia, Illinois, Indiana, Iowa, Kentucky, Maryland, Minnesota, Missouri, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin.

We will continue to monitor the status of American ginseng in the wild, with the understanding that the above finding and associated restrictions may be modified for exports of American ginseng harvested in 2004 if deemed necessary based on any new information that we may receive. In 2005, we will re-evaluate the status of this species, including the outcome of various actions being taken at the State and Federal levels, as described in this finding.

BASIS FOR ADVICE

To ensure that American ginseng (*Panax quinquefolius* L.) remains viable throughout its range in the United States and to determine whether the export of American ginseng will not be detrimental to the survival of the species, DSA annually reviews available information from various sources (other Federal agencies, State regulatory agencies, industry and associations, non-governmental organizations, and researchers) on the status and biology of the species, and specifically for each State from which American ginseng roots are exported.

Biology, ecology, and range of the species

1. American ginseng (hereafter referred to as “ginseng”) is a slow-growing, long-lived (50 plus years) herbaceous perennial of the Araliaceae family (Lewis and Zenger 1982). The species is endemic to Eastern North America, occurring in southern Canada (Ontario and Quebec) west to South Dakota and Oklahoma and south to Georgia (Small and Catling 1999; NatureServe 2001).
2. Ginseng is a species of stable habitats, such as the understory of mid-successional to late-successional deciduous forests (Charron and Gagnon 1991). Plants emerge after the leaf canopy has partially or fully developed (Lewis and Zenger 1982).

3. Although ginseng can grow on a wide variety of soil textures and topographic conditions, it requires moist soils and sites of low evapotranspiration loss (Anderson et al. 1993).

4. Below ground, ginseng forms a thick taproot, a special underground stem known as a vertical rhizome sits on top of the main root and sends up the above-ground stem each year. The rhizome is characterized by large scars that form as a result of the annual abscission or accidental loss of the single subterminal aerial stem. These annual scars are well-marked on the rhizome and can be counted to determine the age of the plant (Lewis and Zenger 1982). Growth rate varies among individuals, so plants with the same number of leaves and leaflets may be close but not identical in age (Anderson 2002).

5. Ginseng leaves are whorled, palmately compound, with three to five leaflets (Radford et al. 1981). An individual whorled leaf with a petiole is referred to as a “prong,” and is commonly used to indicate the size-class or age of individual ginseng plant (Lewis and Zenger 1983; Lockard and Swanson 1998).

6. Typically, ginseng has been divided into four size-classes based on the number of leaves or prongs. Generally, one-prong plants (with 3-5 leaflets) are 2 years of age, two-prong plants (with 10 leaflets) ranged from 3 to 6 years of age, three-prong plants (with 15 leaflets) ranged from 7 to 9 years of age, and four-prong plants (with 20 leaflets) ranged from 10 to 11 years of age (Anderson et al. 1993). Four- and five-prong plants represent the oldest individuals of a population (Lewis and Zenger 1983).

7. Wild ginseng plants do not reproduce until they are at least 4 years of age (Carpenter and Cottam 1982; Anderson et al. 1993; Dunwiddie and Anderson 1999).

8. Ginseng has perfect flowers (bisexual flowers): an individual flower has both stamens (male) and carpels (female) (Carpenter and Cottam 1982; Lewis and Zenger 1982; Schlessman 1985). Although ginseng does have a high natural rate of self-fertilization (Schlessman 1985), outcrossing (cross-pollination) between plants has been reported (Carpenter and Cottam 1982; Lewis and Zenger 1983). However, ginseng is not apomictic: capable of producing seed without any form of fertilization (Carpenter and Cottam 1982).

9. Ginseng is not an obligate outcrosser (Carpenter and Cottam 1982). Ginseng flowers have been observed to be pollinated with and without pollinator assistance (Carpenter and Cottam 1982; Lewis and Zenger 1983; Schlessman 1985). Small bees in the family Halictidae and flies in the family Syrphidae appear to be the major pollinators of ginseng (Carpenter and Cottam 1982; Lewis and Zenger 1983; Schlessman 1985). However, these pollinators probably do not transfer pollen between distant individuals (Carpenter and Cottam 1982).

10. Ginseng fruits turn red at maturity and typically are two-seeded in each berry-like fruit (Lewis and Zenger 1983). Although very infrequent, ginseng fruit can yield three and

four seeds (Anderson et al. 1984; Schlessman 1985). A typical flowering 4-year-old wild ginseng plant may produce 30-40 fruits on each inflorescence (Proctor and Bailey 1987).

11. The fecundity (number of offspring) of ginseng is low, and seed production is positively correlated with age and size of the population (Carpenter and Cottam 1982; Lewis and Zenger 1983; Schlessman 1985). Seed mortality is high, and is the most precarious portion of ginseng's life cycle (Lewis and Zenger 1982). Ginseng does not form a long-term seed bank (Anderson et al. 1984; Charron and Gagnon 1991).

12. To germinate, seeds require an after-ripening process (warm-cold sequence of temperature changes) that averages 18-22 months (Lewis and Zenger 1982; Proctor and Bailey 1987). The embryo is inactive during the first winter, matures during the next growing season, and then endures a second winter before it is able to germinate (Hu et al. 1980). Asexual (vegetative) reproduction of ginseng due to rhizome or root fragmentation is very rare and unknown in most populations (Lewis 1988).

13. Ginseng is physiologically adapted to low light levels, reaching light saturation (the intensity at which an increase in light does not increase photosynthesis) at levels as low as 10% of full sunlight, whereas maximum growth occurs up to 30% of full sunlight (Proctor 1980). At moderate high light levels, ginseng can experience leaf chlorosis, (yellowing caused by loss of or reduced development of chlorophyll) (Gagnon 1999), early leaf senescence, or depressed growth (Anderson 2002).

14. Ginseng plants can senesce (a natural die-back of the plant) during the summer, after the new terminal bud has formed, and can appear "dormant" at the time of fall harvesting (Carpenter and Cottam 1982). More often, it is the largest plants that are likely to senesce early in the summer and as a result do not produce any seed in that year (Carpenter and Cottam 1982).

15. True dormancy in ginseng (failure to produce a vegetative stem) is far less common than early leaf senescence, and can result when there has been physical damage to the plant (e.g., animal damage) (Carpenter and Cottam 1982).

16. Figure 1 (page 28) shows the range of ginseng in North America and its conservation status according to NatureServe, a non-profit organization that compiles and assesses data on plants, animals, and ecological communities collected by the 50 State Natural Heritage Programs, and Canada (NatureServe: An online encyclopedia of life [web application]. 2001. Version 1.4. Arlington, Virginia, USA. URL: <http://www.natureserve.org/>. Accessed June 2, 2003).

Research and monitoring of American ginseng

1. Field studies of ginseng have found that ginseng is highly self-fertile (Schluter and Punja 2000), and pollination can occur between flowers on a single flower head (umbel) or between flower heads. Furthermore, self-pollinated flowers produce the same proportion of seeds as outcrossed (cross-fertilized) flowers (Carpenter and Cottam 1982;

Schlessman 1985). Schlessman (1985) suggested that the high pollen-to-ovule ratio of ginseng inflorescences promotes adequate pollination even though pollinator visits are infrequent. The author speculated that female reproductive success of ginseng is probably governed by the amount of photosynthate allocated to reproduction, rather than by abundance or efficiency of pollinators (Schlessman 1985).

2. Schluter and Punja (2000) confirmed Schlessman and other researchers' observations that ginseng's ability to produce flowers that mature into fruit increases with the age and size of the plant, and is regulated by the availability of site resources, such as nutrients, water, sunlight (Carpenter and Cottam 1982; Lewis and Zenger 1983; Schlessman 1985).

4. A 10-year (1986-1996) demographic study conducted by Dunwiddie and Anderson (1999) on two wild populations of ginseng in Massachusetts found that the number of individual plants that produced fruit varied considerably among years, ranging from 0.5% to 33% (Dunwiddie and Anderson 1999).

5. Field research conducted by Lewis and Zenger (1983) found that only 0.6% of wild ginseng seeds germinated after 20 months. Although the researchers found that the ginseng seeds that did germinate had a high probability (97%) of developing to adulthood (Lewis and Zenger 1983). In contrast in experimental field tests where seeds were sown by humans, germination rates were 55-75%.

6. Monitoring results of 10 wild ginseng populations in West Virginia found that 90% of ginseng seeds remain within 2 meters of the parental plant (Van der Voot cited in McGraw 2003).

7. Researchers in Canada have determined that the minimum viable population (MVP) size for ginseng in Canada is 172 plants, including reproductive and non-reproductive individuals (Nantel et al. 1996). This number was based on the large quantity of fruits (seeds) produced, no large plant dormancy or senescence of individuals, and an average population growth rate of 1.04 (D. Gagnon, University of Quebec, pers. comm.).

8. Based on a data set from 1998 to 2001, Dr. Gagnon calculated the MVP size for ginseng in the Great Smoky Mountains National Park (GSMNP) to be 510 individuals. The estimated size for the GSMNP is much larger than the 172 MVP size for Canada, because, in the GSMNP, populations have a low average growth rate, plants produced fewer fruits (seeds), and some large plants remain dormant or senesce (Gagnon 2003). Dr. Gagnon speculated that a MVP of 510 in the GSMNP may also be related to droughts during the third and fourth years of the study, and that that the remaining populations of ginseng in the park are located on marginal sites because poachers have extirpated ginseng from its preferred habitat (D. Gagnon, University of Quebec, pers. comm.).

9. A demographic study of six ginseng populations (501 plants) in the GSMNP found that 45% of all plants had three prongs and only 8.6% had four prongs. The population growth rates were close to 1.0 (i.e., a stable population), which indicated that, for the populations to remain viable, no harvesting could occur (J. Rock et al. 1999).

10. According to Dr. Gagnon, in general, populations that are growing (even slowly) will have a smaller MVP size than populations that are stable or declining (D. Gagnon, University of Quebec, pers. comm.).

11. Wild-harvesting of ginseng removes the largest reproductive individuals from populations (Charron and Gagnon 1991), which reduces population sizes and the ability of populations to recover (Hackney and McGraw 2001). Research by Hackney and McGraw (2001) shows that small populations of ginseng may be particularly vulnerable to the Allee effect. The Allee effect is when the fertility and survival of individuals of small populations may be diminished once population size descends below a critical threshold (Lande 1987; Caswell 1989; Veit and Lewis 1996; Groom 1998).

12. Hackney and McGraw (2001) tested for reproductive limitations due to small population size (a form of the Allee effect) by experimentally planting 453 individuals of 4-year-old cultivated ginseng plants in small groups. Plant size traits, reproductive traits, and pollinator visits were recorded. According to the researchers, their findings demonstrate that the reduced number of fruits per flower and the reduced number of fruits per plant are consistent with the operation of an Allee effect. They concluded that, for ginseng, knowledge of the presence as well as the mechanism underlying this Allee effect may be especially useful for the management and determination of minimum viable population size of the species in the wild.

13. Charron and Gagnon (1991) found that the maximum sustainable rate of harvest of ginseng is the rate at which mean growth rate exceeds from the equilibrium value of 1.00 (population stability or maintenance).

14. Nantel (1996) and other researchers have calculated that the percentage of sustainable harvest for many native plants, including ginseng, is between 5% and 8% of a population, spread over each size-class of plants. For example, a wild population of 172 plants consisting of individuals in all size-classes (0=seedlings to 4=four leaved plants) would have approximately 55 plants of size-classes 3 and 4. A harvest of 5% of the larger-sized plants would yield 2.9 or 3 plants per year, therefore leaving approximately 52 plants of the larger-size classes (Nantel et al. 1996).

15. Research by Dr. McGraw, of the University of West Virginia, found that the annual sustainable harvest rate for ginseng should be no more than 5% in West Virginia, Kentucky, and Tennessee (the top three leading exporters of wild ginseng in the United States). A harvest rate of 5% would mean that only 5% of plants within a size-class should be harvested. However, a harvester will usually harvest all plants (100%) of the larger plants (three-leaved plants and larger), and may occasionally leave the smaller-sized plants (Nantel et al. 1996; Gagnon 1999).

16. Researchers have concluded that low seed production, slow growth, and poor seed dispersal have prevented historically harvested ginseng populations from expanding to occupy other suitable sites, or from recolonizing habitats where it used to grow (Dunwiddie and Anderson 1999; Rosser and Haywood 2002). As a result, populations

may become restricted and isolated as suitable habitat is fragmented by logging (Rosser and Haywood 2002).

17. Examination by West Virginia University researchers of 915 herbarium specimens of ginseng, deposited in 17 herbaria across the country and collected randomly over a period of 186 years, revealed a significant decrease in the height of wild plants, most of which were collected since 1900 (McGraw 2001). This reduction in plant size was region-specific, with specimens from the northern portion of the species' range in North America remaining the same size, whereas specimens from the core of the species' range (the midwestern, Appalachian, and southern populations) declined in size. Dr. McGraw speculated that the change in the physical size of the specimens was a direct consequence of harvest pressure. Additionally, other researchers have found that the number of ginseng specimens collected for herbaria also declined during the 20th Century, whereas the number of specimens of other closely related species remained the same or increased (K. Flinn, The College of William and Mary, pers. comm.).

18. Anderson (2002) studied 950 commercially harvested wild ginseng roots from 11 States and found no significant relationship between age and root weight for individual states. However, there was a tendency for harvested roots from southern states to have younger mean ages than those harvested from northern states. Furthermore, there was a linear increase in root weight with an increase in latitude for the 11 States. Dr. Anderson's work supports similar findings by McGraw (2001) that suggest harvest pressure is greater in the southern States than in the northern States.

19. Several researchers have suggested that local ginseng populations are highly adapted to local conditions, and that artificial seeding (with non-local seed) may lead to local loss of fitness, which could lead to an erosion of the gene pool (H. Grubbs and Dr. M. Case Ginseng Conference, Louisville, Kentucky, 2000).

20. Holly Grubbs and Dr. Case of the College of William and Mary found that there is high genetic variability among wild ginseng populations, and low genetic variability within populations (Ginseng Conference, Louisville, Kentucky, 2000).

21. Using random amplified polymorphic DNA (RAPD) genetic analysis, researchers found that sampled wild populations of ginseng in North Carolina, Pennsylvania, and Wisconsin, and several cultivated specimens were genetically diverse and different from each other (Boehm et al. 1999). Furthermore, the researchers found that specimens of ginseng from the GSMNP appeared to have a unique genetic integrity, which may represent a distinct center of genetic diversity, as displayed with the coordination of genetic values calculated with RAPD bands. However, the researchers also found that wild specimens of ginseng collected in Pennsylvania displayed low genetic diversity and were similar to cultivated specimens of ginseng. They concluded that, in areas with a history of ginseng harvest, wild ecotypes may be mixed with cultivated varieties (Boehm et al. 1999).

Status, Protection, Harvest, and Trade

1. Ginseng (*Panax quinquefolius* L.) was listed in Appendix II of CITES in 1975. In 1983, we required that all ginseng to be exported had to be certified as either wild or cultivated [artificially propagated] (Carlson 1986). In 1999, to further protect wild populations, we determined that only wild ginseng roots of 5 years of age or older may be exported.

2. The primary cause of decline for ginseng is that of exploitation by harvesters in response to consumer demand (NatureServe 2001). The species is designated as “Endangered” in Canada; the export of wild-harvested ginseng roots is prohibited by law (COSEWIC 2001). In the United States, wild-collection of ginseng is not permitted or is discouraged in Connecticut, Delaware, Maine, Massachusetts, Michigan, and Rhode Island due to declines in populations. Under State laws, ginseng is listed as “endangered” in Maine and as “threatened” in Michigan. Declines have been documented on National Park (NP) lands, U.S. Forest Service (USFS) lands, and throughout many other areas within the species’ range, including in Arkansas, Georgia, Illinois, Indiana, Kentucky, Minnesota, North Carolina, Ohio, Pennsylvania, Virginia, West Virginia, and Wisconsin.

3. Table 1 (pages 22-23) shows the conservation status of ginseng in the United States according to NatureServe (2001). Based on the conservation status ranking system developed by NatureServe, none of the States that currently allow the harvest of wild ginseng received a rating of secure (S5), which would indicate that wild populations of the species are stable (typically more than 100 occurrences, and more than 10,000 individuals). Table 1 also shows the estimated number of populations of ginseng, the percentage of counties from which ginseng is exported, and the estimated number of plants harvested in 2001 (Kauffman 2003).

4. The National Park Service (NPS) prohibits the harvest of native plants from national parks. However, poaching of ginseng continues to occur and takes place not only in major national parks (such as Great Smoky Mountains National Park, Tennessee-North Carolina; Mammoth Cave National Park, Kentucky; and Shenandoah National Park, Virginia), but also in smaller ones (such as Blue Ridge Parkway, North Carolina and Virginia; Little River Canyon National Preserve, Alabama).

5. Between 1991 and 2001, 11,654 pounds of illegally harvested ginseng roots (an estimated 3,496,200 plants) were seized in the GSMNP, which encompasses 800 square miles (512,000 acres) within the core of the species’ range (J. Rock, GSMNP, pers. comm.). In 2002, at Mammoth Cave National Park (MCNP), a poacher was apprehended with 19 pounds of green ginseng roots (an estimated 5,700 plants) (M. DePoy, MCNP, pers. comm.). (An average of 300 roots per pound at a one-to-one ratio of root to plant).

6. To combat the illegal harvest of ginseng in national parks, the NPS has implemented several preventive strategies, such as permanently marking ginseng roots which cause the roots to be unacceptable for sale.

7. Ginseng poaching is not restricted to Federal and State lands; it also affects private land owners (Ginseng Workshop, St. Louis, Missouri, February 19-21, 2003).

8. Historical harvest records indicate that, from 1821 to 1899, an average of 381,000 pounds of wild ginseng root were exported annually from the United States (Anderson 1986). Exports for 1992-2001 have averaged 104,261 pounds (an estimated 31,278,300 plants) annually. Although the total weight of exported ginseng has declined, it is believed to represent a greater number of individual plants than in the 1800s because smaller plants (roots) are being harvested (Haber 1990). This is due to a general decline in the number of older plants available for harvest.

9. In the late 1970s, ginseng roots of wild origin accounted for approximately 30% of the roots exported from North America, primarily to Asian markets. Today, only 3.5% of ginseng exports are wild-harvested roots. To meet the international demand for ginseng, the difference is derived from cultivated plants (Schippman 2001). Nevertheless, the demand for wild ginseng roots remains high due to the preference by Asian consumers for wild roots over cultivated ones.

10. With the exception of Maryland, all of the States that currently have a wild ginseng export program have USFS National Forest lands within their State boundaries (Figure 2, page 29).

11. Due to concerns of over-harvest and the decline of ginseng on USFS lands in the Eastern Region (R-9), in 1999 the Region designated ginseng (*Panax quinquefolius*) as a Regional Forester Sensitive Species on the following National Forests (NF): Shawnee NF, Illinois; Hoosier NF, Indiana; White Mountain NF, Maine and New Hampshire; Ottawa and Huron Manistee NF, Michigan; Green Mountain NF, Vermont; and Chequamegon/Nicolet NF, Wisconsin (Figure 2, page 29)

(URL:http://www.fs.fed.us/r9/wildlife/tes/docs/america_ginseng.pdf. Accessed June 17, 2003). Ginseng cannot be harvested on these NFs except as provided for in tribal agreements or research collection permits (URL: http://www.fs.fed.us/r9/wildlife/tes/docs/america_ginseng.pdf. Accessed June 17, 2003).

12. The purpose of designating species as a USFS Regional Forester Sensitive Species is to protect rare species and their habitats before there is a need to list species as “threatened” or “endangered” under the U.S. Endangered Species Act. Species designated as Sensitive Species are vulnerable due to low populations and other risk factors. By designating ginseng as a Sensitive Species, USFS policy mandates the completion of a conservation assessment of the species. The conservation assessment will provide a review of known information regarding the species’ distribution, habitat, ecology, and population biology. Upon completion, the USFS will develop a conservation strategy for ginseng on NFs in the Eastern Region. Once a conservation strategy is developed, the USFS may choose to work with cooperating agencies or organizations to draft a formal conservation agreement that will identify how the multiple entities can work together to conserve the species

(URL:<http://www.fs.fed.us/r9/wildlife/tes/ca-overview/index.htm>. Accessed June 17, 2003). The completion date for the conservation assessment is scheduled for 2004 (G. Kauffman, USFS, pers. comm.).

13. Only two NFs within the Eastern Region continue to issue harvest permits for ginseng roots: Monongahela NF (West Virginia) and Wayne NF (Ohio). In 2002, the Monongahela NF issued 21 permits (E. Ash, USFS, pers. comm.). The Wayne NF issued 180 permits in 2002, compared to 113 permits issued in 2001 (E. Larson, USFS, pers. comm.).

14. Field studies conducted on the Monongahela NF suggest that ginseng has been reduced in some locations to populations of one to a few dozen individuals (Van der Voort 1998).

15. Allegheny NF (Pennsylvania) and Mark Twain NF (Missouri) in the Eastern Region do not have a formal policy on the issuance of ginseng harvest permits (USFS personnel, pers. comm.). However, the issuance of such permits is discouraged on these two NFs. The Chippewa NF and Superior NF (Minnesota), Finger Lakes NF (New York), and Hiawatha NF (Wisconsin) are within the range of ginseng; however, the species is not currently known to be present within the boundaries of these National Forests (URL:http://www.fs.fed.us/r9/wildlife/tes/docs/rfss_plants_083002.pdf. Accessed June 17, 2003).

16. The majority of the USFS Southern Region (R-8) NFs (except NFs in Texas, Florida, and Puerto Rico) are within the range of ginseng (Figure 2, page 29). Results from field monitoring of ginseng in the Southern Region NFs indicated viability concerns with the continued harvest of ginseng (USFS 2000). According to FS personnel, ginseng on NF lands in the Southern Region has been completely extirpated from one-third of its historic sites, and the remaining ginseng patches are smaller and composed of younger individuals. USFS field data indicated that 95% of the ginseng populations on the NFs in the Southern Region had significant persistence risks (USFS 2000a) and are heading toward conditions in which ginseng will no longer be economically or ecologically viable (Sutter and Kauffman 2000).

17. In 2000, the Southern Region considered a temporary moratorium on the issuance of harvest permits for ginseng due to concerns that collection rates may be exceeding sustainable levels. However, the moratorium was not imposed.

18. However, within the USFS Southern Region, several individual NFs have implemented harvest restrictions. In 2000, the Ozark-St. Francis and the Ouachita NFs in Arkansas established a 5-year moratorium on the harvest of ginseng to prevent further decline in ginseng abundance and until monitoring data indicate that wild populations can sustain harvesting (URL:<http://www.fs.fed.us/oonf/ozark/new/ginseng-letter.html>. Accessed June 17, 2003).

19. Table 2 (page 24) shows the number of permits issued on NFs in the Southern Region from 1999 to 2002 (F. Huber, C. Wentworth, D. Taylor, M. Pistrang, G. Kauffman, USFS, pers. comm.). Harvest permits are issued for either one or two pounds each, and are counted as wet (green) or dry root weight, depending on the particular NF. The high number of permits (787) issued in 2001 on the Nantahala and Pisgah NFs in North

Carolina may have been a result of double-counting the number of permits issued for that year. The actual number is most likely similar to the number of permits (600) issued in 2000 (G. Kauffman, USFS, pers. comm.).

20. To curtail the illegal poaching of ginseng in wilderness areas and other protected areas, the USFS in North Carolina has implemented a marking program similar to that used by the NPS (G. Kauffman, USFS, pers. comm.).

21. In 1979, eight permanent plots (50 x 50 meters) were established on NF lands in the Southern Region to monitor ginseng. The plots were surveyed at various times throughout 1979-1983. The eight plots were re-visited in 1999 and 2000; however, no individuals were located in three of the plots. Population data from the five plots showed a statistically significant decline in the mean population size, from 29.8 plants/plot in 1979 to 5.7 plants/plot in 1999. Results from field surveys in 2000, indicated that 29% of the populations were extirpated, and that within 10 years 43% of the populations would not be viable.

22. Our analysis of the harvest reports submitted by the States for the 2000 and 2001 harvest seasons identified a strong relationship between State counties and NFs lands in the Southern Region and the harvest amounts reported. Most of the ginseng harvested in several States is reported from counties that have large percentages of USFS lands. For example, based on data from the 2000 and 2001 harvest reports from North Carolina, we found that 18 counties with USFS lands accounted for 92% and 93%, respectively, of the total amount of wild ginseng harvested in the State in these years. In Virginia, the percentages of wild ginseng originating from 30 counties with USFS lands are 64% and 75% for the 2000 and 2001 harvest seasons, respectively; and in Georgia, the percentages are 65% and 89% for the 2000 and 2001 harvest seasons, respectively. Figure 3 (page 30) shows ginseng amounts harvested by State counties in 1999 and 2000 (data provided by G. Kauffman, USFS).

23. As reported in our last four findings (1999-2002) for the export of ginseng, the quantity of wild-simulated and woods-grown ginseng has increased in the last decade. However, most States do not report wild-simulated and woods-grown ginseng separately from "wild," thereby potentially affecting the harvest trend data for those States. The effects of reporting these quantities together may indicate erroneously that wild populations within a particular State have remained stable or have increased, allowing a greater harvest.

24. It is possible that the amount of truly wild ginseng being harvested has decreased, potentially due to a host of factors (decrease in abundance, increase in herbivory, habitat destruction), whereas the amount of wild-simulated and woods-grown ginseng have increased, thus compensating for and masking a decline in truly wild ginseng.

25. We are also concerned that small-size ginseng roots (less than 5 years old) are being harvested from the wild to be replanted in other areas, or sold domestically as "green" roots. The removal of these young plants from wild populations reduces the number of

seeds produced and, therefore, future recruitment of individuals into those wild populations.

New Information and Research

1. The Fish and Wildlife Service (Service), the ginseng export States, industry, academic researchers, and others are working together to improve our understanding and knowledge of wild ginseng, and to better assess the impact of harvest on wild ginseng populations. To this end, the Service held a workshop with scientific researchers, the States, Animal and Plant Health Inspection Service (APHIS), and the USFS during February 19-21, 2003, in St. Louis, Missouri. Current and ongoing research presented at the workshop is included in this finding.

2. In 2003, we initiated a research study, to be conducted by the U.S. Geological Survey/Biological Resources Division (USGS/BRD) and with assistance from the USFS, to develop a predictive habitat modeling database for ginseng within the core range of ginseng in the southern Appalachians. Completion of this project is expected in the fall of 2004. The second phase of the project will be to verify and inventory identified habitat locations for ginseng.

3. In 2001, Dr. McGraw (2003) established 27 long-term monitoring plots for ginseng in Kentucky, Virginia, and West Virginia, with one additional site in Indiana. Results from two field seasons (2001 and 2002) show that many of the populations are small, with only a few individuals, and that older three- and four-pronged plants were absent from most of the 27 populations (Table 3, page 24). Nine populations in Kentucky (the State with the largest amount of ginseng harvested) were found to be expanding slightly, whereas the 12 populations in West Virginia (the State with the second largest annual harvest) were declining slightly. Although these rates are only based on two season's worth of data, Dr. McGraw speculated that the differences between the populations in the two States may be due to higher rates of seed production for ginseng in Kentucky (although lower germination rates), compared to populations in West Virginia. The West Virginia populations may have been also affected by deer browse (McGraw 2003).

4. Jones et al. (2003) analyzed 25 years of field data, collected from 115 one-acre ginseng sites throughout the State of Kentucky, to determine if the ginseng populations had increased, remained stable, or decreased at these sites. Using correlation analysis, Dr. Jones determined that 39 sites (34%) had a high positive correlation coefficient, indicating an increase of populations over time, whereas 16 sites (14%) showed populations were declining over time. Analysis of the remaining 60 sites indicated that populations have remained relatively stable (slightly positive or slightly negative) over time.

5. The Missouri Department of Natural Resources monitored an average of 370 ginseng plants for 6 years (Drees 2003). A significant finding from the field study was that, when the white-tailed deer (*Odocoileus virginianus*) population peaked, at least 41% of all ginseng reproduction was aborted due to deer herbivory (Drees 2003). Repeated grazing

of ginseng by deer resulted in a substantial decline in the percentage of mature plants that produce inflorescences. However, when the deer population was reduced, the reproductive success of ginseng improved. The author concluded that repeated deer browse can stress ginseng populations and result in a substantial decline in the percentage of mature plants that produce fruit (Drees 2003).

6. Based on field monitoring data, the maturity of ginseng fruit at the time of root harvest can significantly affect seed viability and germination (McGraw 2003). Ginseng monitoring in West Virginia revealed that 75% of ginseng fruits were still green on August 15, the start of the harvest season in that State. The field data also showed that the harvest of ginseng roots prior to full fruit ripening (red fruit) can drive a population's growth rate below an equilibrium value of 1.00 (declining population) (McGraw 2003).

7. Furthermore, the depth at which ginseng seeds are planted directly affects the germination of seed. Based on field studies the lowest seed germination was recorded at 0 cm (on the soil surface) and the largest amount of germination was at a depth of 2.5 cm (1 inch), with rates decreasing thereafter (McGraw 2003a).

8. In 2004, the results of a demographic study of six ginseng populations (510 plants total) in the GSMNP will be published in a scientific journal (D. Gagnon, University of Quebec, pers. comm.). The study consisted of monitoring two populations for 4 years (1998-2001) and four populations for 3 years (1999-2001). According Dr. Gagnon, a significant finding of the study was that large plant dormancy in ginseng was confirmed for the first time. Within the six populations, an average of 8% of the plants were dormant in any year. Most plants emerged after 1 year (with decrease in size); however, 12% remained dormant for 2 years. Overall, seed production was very low, declining from 1998 to 2000, and averaged 10 seeds per four-pronged plant. Population growth rates calculated from matrices average 0.997 (declining populations). Stochastic projections indicated that these populations are barely maintaining themselves and can not tolerate any harvesting. According to Dr. Gagnon, large plant dormancy, low seed production, and low population growth rates appear to be related to droughts during the third and fourth years of the study (D. Gagnon, University of Quebec, pers. comm.).

9. The genetic diversity of 21 ginseng populations (1,317 plants) consisting of 8 protected sites and 13 unprotected sites in four states (Georgia, Maryland, North Carolina, and West Virginia) was analyzed (Cruse-Sanders and Hamrick 2003). The genetic diversity of 21 ginseng populations (1,317 plants) consisting of 8 protected sites and 13 unprotected sites in four states (Georgia, Maryland, North Carolina, and West Virginia) was analyzed (Cruse-Sanders and Hamrick 2003). The researchers found significantly greater genetic diversity (higher heterozygosity), greater portion of older plants, and larger stage-class of individuals within protected populations than within populations in which harvesting had occurred. Genetic structure was significantly greater among unprotected populations ($G_{ST}= 0.491$) than among protected populations ($G_{ST}= 0.167$). According to the researchers, the differences in the level and distribution of genetic diversity in these populations indicate that harvesting reduces genetic diversity and may

have significant evolutionary implications for this species (Cruse-Sanders and Hamrick 2003).

Alternative ginseng growing methods

Although this finding primarily covers truly wild ginseng, it also includes ginseng derived from other growing methods used to produce harvestable roots for export. Unfortunately, consistent terminology for different growing methods used are not universally applied, and not all States track these methods or separately report ginseng harvested from such methods (e.g., wild-simulated and woods-grown are often included in State harvest data sheets as wild). We are therefore unable to categorically determine that any of these alternative methods would qualify as artificial propagation according to the CITES definition. Without clarification from individual States, we currently consider ginseng from these alternative growing methods to be wild when they are from the States covered by this finding, although we could take a different approach in the future if we can resolve the inconsistencies involved in the application of these terms.

The two most popular growing methods used for ginseng are “wild-simulated” and “woods-grown.” We have reviewed available information on these methods from various sources, including State Cooperative Extension programs, universities, non-profit organizations, and public literature. Although we recognized that there may be variation in the application of these methods, the following information is a brief summary of these two alternative growing methods.

Wild-simulated ginseng

1. Much of the ginseng harvested as wild-simulated comes from natural woods in the Appalachian-Allegheny Mountains in parts of Kentucky, New York, Pennsylvania, Tennessee, and West Virginia, and a lesser amount from the Ozark Plateau of Arkansas and Missouri (URL: <http://attra.ncat.org/attra-pub/ginsgold.html> Accessed January 22, 2003).
2. Wild-simulated ginseng is grown in a natural forest environment with 70%-80% shade, and with minimal site preparation and maintenance (URL: <http://www.ext.vt.edu/pubs/forestry/354-312/354-312.html> Accessed January 22, 2003). Although non-stratified ginseng seed can be planted, most references recommend planting stratified seed in the fall, after trees drop their leaves (URL: <http://www.ext.vt.edu/pubs/forestry/354-312/354-312.html> Accessed January 22, 2003). Typically, the ground layer of mulch is pulled back by hand or raked back; the seed is then broadcasted, and covered with soil and mulch (Beyfuss 1999). Small ginseng transplant roots have also been reported to be planted under wild-simulated production method.
3. The ginseng plants are usually left to grow naturally, with occasional vegetation control as necessary (Beyfuss 1999). Pesticides and fertilizers are applied at the owner's discretion (Beyfuss 1999).

4. Wild-simulated ginseng grown from seed is typically harvested at 6-15 years of age (average 9-12 years) (URL: <http://www.mdc.mo.gov/nathis/plantpage/flora/ginseng/>; <http://www.uky.edu/Ag/NewCrops/introsheets/ginsengintro.pdf> Accessed June 23, 2003). In general, harvested roots closely approximate the appearance of truly wild ginseng roots, such as in color, texture, and shape of root (URL:<http://www.unl.edu/nac/afnotes/ff-4/index.html> ; <http://www.uky.edu/Ag/NewCrops/introsheets/ginsengintro.pdf> Accessed January 22, 2003).

Woods-grown ginseng

1. Woods-grown or “woods-cultivated” ginseng often refers to ginseng grown under a forest canopy with a range in the amount of human intervention. Typically, large continuous forested areas that provide 70%-80% natural shade are selected for woods-grown ginseng (Scott et al. 1995; Beyfuss 1999; URL: <http://www.conservation.state.mo.us/nathis/plantpage/flora/ginseng/> ; <http://www.uky.edu/Ag/NewCrops/introsheets/ginsengintro.pdf> ; <http://www.hort.purdue.edu/newcrop/newcropsnews/94-4-1/ginseng.html> Accessed January 22, 2003).

2. Much of the literature available on cultivation of woods-grown ginseng recommend using intensive management techniques, as described below (Scott et al. 1995; Beyfuss 1999; URL: <http://www.conservation.state.mo.us/nathis/plantpage/flora/ginseng/> ; <http://www.hort.purdue.edu/newcrop/newcropsnews/94-4-1/ginseng.html> Accessed January 22, 2003).

3. Site preparation for woods-grown ginseng begins with clearing the understory vegetation and undesirable trees, shrubs, and large rocks (Scott et al. 1995; Beyfuss 1999; URL: <http://www.hort.purdue.edu/newcrop/newcropsnews/94-4-1/ginseng.html> ; <http://www.uky.edu/Ag/NewCrops/introsheets/ginsengintro.pdf> ; <http://www.sfp.forprod.vt.edu/factsheets/ginseng.pdf> Accessed January 22, 2003). The soil is tilled usually 4-8 inches either by a rototiller or by hand (Beyfuss 1999; <http://www.sfp.forprod.vt.edu/factsheets/ginseng.pdf> Accessed January 22, 2003). Depending on the location, soil amendments such as limestone, gypsum, and chemical or organic fertilizers may be added to the soil as necessary (Davis 1997; Beyfuss 1999; Das et al. 2001; URL:<http://www.ext.vt.edu/pubs/forestry/354-312/354-312.html> Accessed January 22, 2003).

4. Although non-stratified ginseng seed can be planted, most references recommend planting stratified seed in the late summer or fall. A typical application rate is 40-50 pounds per acre (Scott et al. 1995; Beyfuss 1999). There are approximately 7,000 to 8,000 ginseng seeds per pound (Beyfuss 1999; URL: <http://www.hort.purdue.edu/newcrop/newcropsnews/94-4-1/ginseng.html> ; Accessed June 23, 2003). To ensure a more uniform stand of plants and to reduce the time from planting to harvest of roots, some references recommend planting cultivated seedlings or cultivated transplant roots (rootlets) (Davis 1997; Beyfuss 1999; Das et al. 2001).

5. Typically, ginseng seed is planted in beds, which are routinely manually cleaned of competing vegetation (URL: <http://www.ext.vt.edu/pubs/forestry/354-312/354-312.html> Accessed January 22, 2003). Pesticides are applied for insect, disease, and rodent control, as necessary (Beyfuss 1999).

6. Typically, woods-grown ginseng from seed requires 6-8 years to obtain a size suitable for harvesting (Scott et al. 1995; Davis 1997; Beyfuss 1999; URL:<http://www.uky.edu/Ag/NewCrops/introsheets/ginsengintro.pdf> Accessed June 23, 2003). A general “rule of thumb” is that from 100 to 300 dried ginseng roots yield one dried pound of roots (Beyfuss 1999).

New Information on State Regulation of Harvest

1. As of April 1, 2003, the State of North Carolina will require wild-collected ginseng plants to be at least 5 years old and have three prongs (leaves) or, in the absence of leaves, have at least four discernible bud scars plus a bud on the rhizome. The new State regulation requires harvesters to plant the seeds of harvested plants within 100 feet of where ginseng is located in the wild (Rules on Ginseng Collection and Trade in North Carolina. NC Administration Code Title 2 48F. As submitted to DMA in 2003).

2. The Ohio Department of Natural Resources (ODNR) will implement the following changes in their State regulations for the 2003 ginseng harvest season: the harvest season will start September 1 (instead of August 15) and no harvest will be allowed on State lands (S. Zook, ODNR, pers. comm.).

3. The Pennsylvania Department of Conservation and Natural Resources (PDCNR) is in the process of amending their current ginseng harvest season start date of August 1 to September 1. According to PDCNR, the new harvest start date should be in effect for the 2004 harvest season (C. Rohrbach, PDCNR, pers. comm.).

Fish and Wildlife Service outreach efforts in 2003

1. We and the Division of Management Authority held a workshop with State ginseng program representatives, and other Federal agencies (USFS and APHIS), February 19-21, 2003, in St. Louis, Missouri. Over the course of 3 days, new and ongoing ginseng research was presented by State, Federal, and university researchers; the status, management, and conservation of the species was discussed; and general recommendations were developed by the group. Table 4 (page 25) lists the management issues and general recommendations, and Table 5 (page 26) contains the trade and export issues and general recommendations from the workshop.

2. We also held a public meeting on May 21, 2003, in Lexington, Kentucky. The purpose of the public meeting was to discuss U.S. obligations under CITES related to the export of ginseng, and to obtain new information on the biological and trade status of the species. To notify the public of the meeting we published a *Federal Register* notice (Vol. 68, No. 78) on April 23, 2003. All State programs were notified in advance of the

meeting, and were encouraged to notify representatives of the ginseng industry in their States.

3. Attendees included growers, buyers and dealers, and exporters of ginseng from 12 States. In addition, representatives from State and other Federal agencies (USFS, and NPS) also participated. Among the ginseng growers and trade representatives that attended the meeting, a general consensus was voiced that the current age requirement (roots must be 5 years of age or older) for the export of ginseng may not be sufficient to ensure the long-term survival of the species. There was also acknowledgement amongst the group that many State harvest seasons start too early, before ginseng fruit is mature, and should be changed to when the fruit is mature (red). Additionally, there was a general recommendation that ginseng harvesters need to be better informed of when and how much to harvest, the correct planting depth for ginseng seeds, and the potential negative impacts from planting cultivated ginseng seeds in the wild, such as genetic erosion and introduction of diseases. Several participants recommended that the ginseng industry should play a greater role in the conservation and sustainable harvest of ginseng.

4. DSA met with USFS national resource program directors to discuss ginseng management, harvest, and conservation issues on National Forest lands.

Conclusions

1. There is a substantial amount of scientific literature on the concept of minimum viable population size of plant species needed to buffer the effects of various types of stochastic risk (demographic, genetic, environmental, habitat loss, etc.). Several researchers have suggested a minimum viable population size range for ginseng to be 172 individuals in the most northern portion of the species' range (Canada) and up to 500 individuals in the southern portion of its range (GSMNP) (Nantel et al. 1996; D. Gagnon, University of Quebec, pers. comm.).

2. Research has shown that harvesting of ginseng reduces population size and, as with most species, small population size reduces genetic diversity, which over time reduces the species' ability to adapt to changing or variable environments (Hackney and McGraw 2000; Anderson 2002; Cruse-Sanders and Hamrick 2003). Ginseng's life history traits increase ginseng's vulnerability to stochastic risk: small populations, relative long pre-reproductive period (reproductive plants are at least 4 years), low fecundity and high seed mortality, and short-distance seed dispersal (seed stays within 2-3 meters of parent plant) (Carpenter and Cottam 1982; Lewis and Zenger 1982; Lewis and Zenger 1983; Anderson et al. 1984; Schlessman 1985; Charron and Gagnon 1991; Anderson et al. 1993; Van der Voot 1998; Dunwiddie and Anderson 1999; Anderson 2002).

3. Regardless of the historical abundance of ginseng, populations have dramatically declined in the last century, and in some locations populations have been reduced to a few dozen individuals (Van der Voot 1998). Field surveys of ginseng throughout portions of its range (Arkansas, Illinois, Indiana, Kentucky, Missouri, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia) have found that population sizes

that would indicate a minimum viable population size of 172-500 individuals are rarely encountered (Gagnon 1999; Drees 2003; Jones et al. 2003; Kauffman 2003; McGraw 2003).

4. In Canada, the species is listed as “endangered”; in Maine, it is listed as “endangered,” and it is listed as “threatened” in Michigan. Due to scarcity of the species, several other States within its range prohibit or discourage the wild-collection of ginseng (Connecticut, Delaware, Massachusetts, New Jersey, and Rhode Island). National Forests in the States of Illinois, Indiana, Maine, Michigan, New Hampshire, Vermont, and Wisconsin have prohibited the issuance of harvest permits and have included the species on the USFS Regional Foresters Sensitive Species list. Several of the National Forests in the Southern Region have also restricted or reduced the number of harvest permits issued.

5. We are concerned that the amount of ginseng harvested may exceed the amount authorized under USFS collection permits. The USFS collection permits are limited to 1-2 pounds per permit and follow State harvest rules and regulations (harvest season, age of plants, and planting of seeds). However, once harvest permits are issued by a NF, there is little oversight or enforcement of these harvest restrictions. Furthermore, many State harvest seasons start before ginseng fruit is mature, thereby reducing the number of new recruits. Discussions with USFS botanists support our suspicion that the amount of wild ginseng harvested from NF lands most likely exceeds the 1-2 pounds allowed by the USFS. Additionally, there are concerns that ginseng poaching is occurring on USFS lands during and outside of State harvest seasons, and that State harvest season start before ginseng fruit is mature.

6. Harvest is prohibited on NPS lands; however, ginseng continues to be illegally poached from NPS (e.g., MCNP, GSMNP).

7. With the exception of six States (Alabama, Iowa, Maryland, Minnesota, Pennsylvania, Virginia), all of the other States with a wild ginseng export program do not allow harvest on State lands.

8. Most States continue to report that they do not have the resources (monetary, personnel, etc.) to survey State lands to assess the status of the species (e.g., abundance, distribution) within their respective States.

9. We are concerned that the Georgia, Kentucky, Maryland, Tennessee, Virginia, and West Virginia harvest seasons start in August before ginseng fruit is fully mature (red), which decreases future offspring and recruitment, even if seeds from harvested plants are planted as required by these States (except Virginia) (Table 6, page 27). As previously stated in this finding, this will affect the long-term survival of the species.

10. We are concerned that ginseng harvesters may not be planting seed at the recommended depth of 1 inch in the soil.

11. Recent genetic research on ginseng, as well as research discussed in this finding, has identified several factors, such as planting of non-local or commercial seed into natural woodlands and the effects of over-harvest of ginseng populations, which indicate that the species' long-term genetic diversity and survival may be affected by such actions.

12. In 1999, under a study funded by DSA, Dr. Gagnon analyzed the long-term sustainability of ginseng harvested from the wild and reported that the wild-collection of ginseng is generally thought to be biologically unsustainable and offers no incentive for species or habitat conservation (Gagnon 1999).

13. In a recent IUCN assessment of the conservation and sustainability of ginseng, the paper concluded that the general consensus points to a reduction and continuing decline of ginseng populations, and the harvest of smaller wild roots than in previous years (Rosser and Haywood 2002). The study concluded that the likelihood that ginseng exports are sustainable may not be high and the system may require more oversight (Rosser and Haywood 2002).

14. Although the Service does not regulate harvest of ginseng, only the export, we continue to work with the States and other Federal agencies (USFS, NPS) that are responsible for managing the species and its habitat on their lands, and to ensure the long-term viability of the species.

15. Currently, and throughout the past several years, we have:

- Initiated in 2003 with the USGS/BRD, the development of a habitat modeling database. The database will be used to estimate the potential distribution of ginseng based on habitat availability. Phase two of the project will be to verify and inventory probable ginseng locations.
- Sponsored two ginseng workshops (Missouri, 2003, and Kentucky, 2000) and one public meeting (Kentucky, 2003).
- Established a ginseng listserv for State ginseng coordinators and Federal agencies to share ginseng information and research.
- Discussed with USFS and NPS personnel our concerns about the status of ginseng on National Forest and National Park Service lands.
- Funded field inventories and monitor studies, and status assessment of ginseng. We have, and continue to share the results of these studies with Federal and State agencies, and the public.
- In 1999, we implemented a minimum-age requirement (5 years or older) for the export of wild ginseng roots.

16. Our non-detriment finding is based on the best available biological information on the status of the species. We have assessed the status of ginseng by direct means, such as ongoing research studies, field inventories, population assessments, and scientific literature, and through indirect means, such as monitoring State harvest levels, reports by other Federal agencies of ginseng poaching on their lands, and State and Federal conservation and protection efforts.

17. However, we continue to believe that an increasing amount of ginseng exported as “wild” may actually be wild-simulated or woods-grown. Although ginseng harvested from these growing methods is not likely to be detrimental to truly wild ginseng, these amounts may inflate the harvest data for truly wild ginseng. This is compounded by the fact that these roots are often indistinguishable through visual inspection from truly wild ginseng roots.

18. Furthermore, many of the exporting States have Cooperative Extension programs that provide public educational information on growing wild-simulated and woods-grown ginseng (Arkansas, Indiana, Kentucky, Minnesota, Missouri, North Carolina, New York, Pennsylvania, Virginia, and West Virginia). We are concerned that the State regulatory agencies responsible for overseeing the ginseng program in their respective State may not be communicating with their State Cooperative Extension office about the use and extent of alternative growing methods used for ginseng in their State.

19. We have previously found that the export of wild ginseng from all of the States covered by this finding to be not detrimental to the survival of the species based on the regulation of wild ginseng harvest by those States.

20. Although we remain concerned about the impact of international trade on this species, we note that some improvements have occurred in the regulation of ginseng, and we have obtained information to show that, although harvest has adversely affected some ginseng populations, that is not necessarily the case. There is greater attention being directed toward the development of sustainable-harvest strategies for the species. State and Federal agencies are improving coordination on research, management, and regulation of harvest and enforcement, and increasing effort has been and will be directed toward outreach and education of the public on sustainable harvest methods and other activities to assist in the conservation of the species. Therefore, we have concluded that the exports of wild ginseng harvested in 2003 and 2004 will not be detrimental to the survival of the species, provided the following **CONDITION** is met:

Ginseng (*Panax quinquefolius*) roots harvested in 2003 and 2004 and certified by the States as **wild**, may be exported provided that the roots are **5 years of age or older**. (Age of ginseng roots at the time of harvest can be determined by counting the number of bud-scale scars on the rhizome. A single scar is produced after abscission of the plants’ aerial stem each year.)

Future Actions

In preparation for making our non-detriment finding on exports of ginseng in 2005, we will be assessing whether further progress has been made by Federal and State agencies involved in ginseng monitoring, conservation, and harvest regulation. We will seek up-to-date information on the status of the species, including any the results of any field surveys and additional protections afforded to it, and will discuss and recommend, as appropriate, specific additional measures that may contribute to the conservation of the species and sustainable harvest of ginseng for export.

We will also evaluate the following information for our finding in 2005:

1. Two reports: the long-term monitoring results of ginseng in the GSMNP and the USFS Conservation Assessment of ginseng. Upon completion of the USFS Conservation Assessment of ginseng, we will consult with the USFS to determine what effect their finding may have on the export of ginseng.
2. NatureServe will conduct a general re-assessment of the global (range-wide) status of ginseng in 2003-2004 (L. Morse, NatureServe, pers. comm.).
3. We will work with Federal, State, and private-sector partners to investigate other means for expanding efforts to monitor the status of ginseng in the wild and ensure that harvest levels are sustainable for both the short and long term.
4. To prevent the harvest of pre-reproductive ginseng plants and to ensure the long-term survival of ginseng in the wild, we will recommend that **Illinois**, the only State without a minimum-age or -size requirement for harvest, implement one that is consistent with the minimum-age requirement for export. We will also recommend that the States of **Illinois** and **Virginia** require harvesters to plant the seeds of harvested ginseng plants.
5. We will consult with **Georgia, Kentucky, Maryland, Tennessee, Virginia, and West Virginia** to encourage these States to revise their ginseng harvest season start dates to coincide with when ginseng fruits are actually known to be mature (red) in these States.
6. We will examine the possibility of holding additional public meetings and educational outreach workshops with State agencies. We will target outreach efforts to harvesters and dealers to promote good harvest practices.
7. We will also explore mechanisms to increase communication, cooperation, and coordination with States at a bioregional level.
8. To improve our analysis, we will continue to encourage all States to report values for dry roots per pound in their annual harvest reports, so that we can continue to evaluate these data as an indicator of the impact of harvest on wild ginseng populations.
9. We will continue to discuss with the States the use of non-local or “commercial” seed for replanting of ginseng. Although we support, in principle, the concept of species’ restoration as a conservation measure, we do not support the planting of “commercial”

seed in native woodlands. We are greatly concerned about the origin of ginseng seed for restoration purposes and the impact of non-local ginseng seed on local gene pools of wild populations of ginseng. Moreover, we are especially concerned where the species is less common, particularly in those States where it is listed as endangered or threatened (i.e., Maine and Michigan), where random planting of non-local seed may have an even greater adverse effect on ginseng populations.

10. We will consider and discuss with the States and Federal land management agencies what other effective conservation measures can be implemented to ensure the long-term survival of ginseng.

Table 1. NatureServe status rank, State listing, estimated number of populations of ginseng, percent of counties with ginseng export, estimated plants harvested in 2001.

State	Status rank¹	State listing	Estimated populations based on status rank or tracked data	Percent of counties with ginseng²	Estimated plants harvested in 2001³
Alabama	S4	none	101-1000	37%	164,000
Arkansas	S4	none	101-1000	44%	188,000
Connecticut	S3	Species of Special concern	21-200	100%	harvest is not known to occur
Delaware	S2	Species of Conservation	6-20	33%	harvest is not known to occur
District of Columbia	SH	historical	historical	100%	na
Georgia	S3	none	21-100	61%	158,000
Illinois	S3?	none	21-75	100%	832,000
Indiana	S3	none	21-100	99%	2,361,000
Iowa	S3	none	21-100	85%	95,000
Kansas	SR	none	not available		harvest is not known to occur
Kentucky	S4	none	101-1000	100%	5,120,000

Louisiana	S1	Rare	1-6	2%	harvest is not known to occur
Maine	S2	Endangered	29	56%	no wild harvest allowed
Maryland	S3	Watch List	21-100	63%	18,500
Massachusetts	S3	Listed	47	36%	harvest is not known to occur
Michigan	S2/S3	Threatened	21-100	42%	no wild harvest allowed
Minnesota	S3	Watch List	21-100	45%	275,000
Mississippi	S3	Watch List	21-100	37%	harvest is not known to occur
Missouri	S4	none	101-1000	63%	338,000
Nebraska	S1	Threatened	1-6	11%	harvest is not known to occur
New Hampshire	S2	Threatened	28 extant, 13 historical	90%	harvest is not known to occur
New Jersey	S2	Species of Concern	6-20	5%	harvest is not known to occur
New York	S4	none	not available	68%	108,000
North Carolina	S4	Watch List	101-1000	48%	2,478,000
Ohio	SR	none	not available	100%	1,158,000
Oklahoma	S1	Watch List	1-6	1%	harvest is not known to occur
Pennsylvania	S4	none	101-1000	99%	275,000
Rhode Island	S1	Endangered	6-20	20%	harvest is not known to occur
South Carolina		none			harvest is not known to occur
South Dakota	S1	Rare	1-6	6%	harvest is not

					known to occur
Tennessee	S3	Watch List	21-100	85%	2,927,000
Vermont	S2/S3	Watch List	15-50	93%	20,500
Virginia	S4	Watch List	101-1000	70%	1,028,000
West Virginia	S3/S4	none	20-500	99%	1,304,000
Wisconsin	S4	none	101-1000	79%	281,000

¹ Explanation of NatureServe ranking system is the following. Critically imperiled (S1): typically 5 or fewer occurrences, or fewer than 1,000 individuals. Imperiled (S2): typically 6 to 20 occurrences with few remaining individuals (1,000 to 3,000). Vulnerable (S3): typically 21 to 100 occurrences, with 3,000 to 10,000 individuals. Apparently secure (S4): typically 100 occurrences with more than 10,000 individuals; the species is considered uncommon but not rare. SR indicates that reports were received from the States, but without persuasive documentation to assign a ranking.

² Percent of State counties with ginseng (Kauffman 2003).

³ Estimates based on 2001 State harvest amounts and average number of dry roots/pound.

Table 2. Permits issued on USFS National Forests in the Southern Region from 1999 to 2002.

Southern Region National Forests	Permits issued in 2002	Permits issued in 2001	Permits issued in 2000	Permits issued in 1999
The George Washington and Jefferson NF in Virginia, West Virginia, and Kentucky.	20	32	not available	not available
Chattahoochee NF in Georgia	8	11	not available	not available
Daniel Boone NF in Kentucky	56	22	not available	not available
Cherokee NF in Tennessee	not available	67.5	79	44

Nantahala and Pisgah 355 787 600 400
 NF in North Carolina

Table 3. McGraw (2003) monitoring results of 27 populations from two field seasons (2001 and 2002).

State	Populations Monitored	Number of Individuals	Growth Rate
Indiana	1	145	0.98
Kentucky	9	1460	1.08
Virginia	5	382	0.98
West Virginia	12	1533	0.98
Pooled	27	3520	1.04

Table 4. Results of the FWS-State Ginseng Workshop, St. Louis, Missouri, February 19-21, 2003.

Status and Management Issues

Recommendations

Monitoring - significant advances have made and were reported at the workshop, but remains ongoing priority.

Continue to advance monitoring efforts; review and implement low-intensity monitoring protocol; coordinate monitoring on a range-wide level.

Addressing biological issues - significant new research presented, but research gaps remain and new biological issues identified.

Undertake targeted research on issues, including: population dynamics and viability analysis, impact of different management regimes, and genetics and pollination biology.

Funding - acknowledgment among group members of the catalytic role of FWS and other seed money (including state-level) in research, but funding needs to continue and be expanded.

Identify funding sources; explore additional sources of funding at the Federal and State levels, and within the industry and the private sector.

Communication - increased communication required among and between Federal and State agencies, industry, and other non-governmental players.

Facilitate communication through Web site, listserve, and other appropriate means.

Age- and size-based restrictions on export of wild ginseng - discussion of whether there

Further evaluate approaches to controlling and monitoring ginseng harvest and trade;

is a need for further restrictions, and if so, what options might be.

considering different levels of the trade stream (e.g., digger, dealer, export), ginseng characteristics that could be monitored (e.g., prongs, roots/lb.) and authority at different levels of government.

Law enforcement - increasing the profile and importance of law enforcement in support of management efforts.

Educate, share information and engage law enforcement on the ginseng issue and involve them in future meetings; develop outreach materials aimed at this audience.

Table 5. Results of the FWS/State Ginseng Workshop, St. Louis Missouri, February 19-21, 2003.

Trade and Export Issues

Recommendations

Reporting requirements - consider the burden imposed on States and industry and the utility to the data required for CITES findings.

Continue to clarify, simplify and refine reporting requirements as appropriate.

Production system categories – clarify the production system categories and determine the utility of using them for export reports.

Further discussion within FWS and further input from stakeholders on definitions, reporting, and ability to implement production system categories.

Education and outreach - key to implementation of management and trade measures.

Facilitate sharing of already available education and outreach materials through improved communication mechanisms.

Regional coordination - agreement regarding the need for more direct State to State interaction in addition to FWS mediated consultation; discussion of the utility of identifying ginseng bioregions.

Explore mechanisms to increase inter-state, inter-agency (Federal) communication, cooperation and coordination at bioregional level, while maintaining FWS mediated consultation mechanisms; consider existing groups/associations which might serve as a home for such efforts. The group identified four possible regions for pilot efforts on information sharing, consultation and coordination on management and law enforcement.¹

Future of USDA/APHIS - discussion on how the transfer of some APHIS personnel to the Department of Homeland Security (DHS) will impact inspection of ginseng exports.

Clarify future role of APHIS and DHS in ginseng inspections.

Law enforcement at the State level - significant examples of ginseng enforcement highlighted at the meeting.

Raise profile of law enforcement efforts in future ginseng coordination meetings.

¹ (AL, GA, KY, MD, NC, PA, SC, TN, VA, WV), (New England States, VT, NJ, NY, PA & MD), (AR, MO, OH), (IA, IL, IN, KY, MI, MN, OH, WI, WV)

Table 6. Current State ginseng regulations.

State	Harvest season	Require seeds to be planted at site	Minimum age (number of leaves/prongs) required for harvested plants
Alabama	Sept 1 - Dec 13	yes	3 prongs
Arkansas	Sept 1 - Dec 1	yes	5 years, 3 prongs
Georgia	Aug 15 - Dec 31	yes	3 prongs
Illinois	Last Saturday in August- Nov 1	encouraged	no requirement
Indiana	Sept 1 - Dec 31	yes	3 prongs, a flowering or fruiting stalk, or 4 internodes on root
Iowa	Sept 1- Oct 31	yes	3 prongs
Kentucky	Aug 15 - Dec 1	yes	5 years, 3 prongs
Maryland	Aug 20 - Dec 1	yes	5 years, 3 prongs
Minnesota	Sept 1 - Dec 31	yes	3 prongs
Missouri	Sept 1 - Dec 31	yes	3 prongs or plants with fruiting stems
New York	Sept 1 - Nov 30	yes	3 prongs
North Carolina	Sept 1 – April 1	yes	5 years, 3 prongs
Ohio	Sept 1 – Dec 31	yes	3 prongs
Pennsylvania	Aug 1 - Nov 30	yes	3 prongs
	For 2003 season;		
	Sept 1 - Nov 30		
	For 2004 season, and thereafter		

State	Harvest season	Require seeds to be planted at site	Minimum age (number of leaves/prongs) required for harvested plants
Tennessee	Aug 15 - Dec 31	yes	5 years, 3 prongs
Vermont	Aug 20 - Oct 10	yes	5 years, 3 prongs
Virginia	Aug 15 - Dec 31	no	3 prongs
West Virginia	Aug 15 - Nov 30	yes	3 prongs
Wisconsin	Sept 1 – Nov 1	yes	3 prongs and mature fruits

[Figure 1.](#) Map of American ginseng conservation status rank in the United States and Canada (NatureServe 2000).

[Figure 2.](#) Map of American ginseng range in the United States, the States that export wild ginseng, and USFS lands (Kauffman 2003).

[Figure 3.](#) American ginseng harvest data by county averaged for 1999 and 2000. Coloring of individual counties is delineated by white (no harvest), grey (1-50 lbs), blue (51-100 lbs), green (101-200 lbs), yellow (201-400 lbs), red-brown (401-1000 lbs), and pink (> 1000 lbs) (Kauffman 2003).

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