



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 /s/ Robert R. Gabel

Subject: Convention permit applications for wild American ginseng harvested in 2005

This document constitutes our finding on the export of wild American ginseng, *Panax quinquefolius*, to be harvested during the 2005 season. (See [Annex 1](#) for a more extensive review of American ginseng.)

Please, be advised that, based on our analysis of available information, we find that the export of **wild American ginseng roots from plants 10 years of age or older** (i.e., with 10 or more bud-scale scars on the rhizome) harvested during the 2005 season 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.

The export of wild-simulated and woodsgrown ginseng that is younger than 10 years of age, which is treated as wild for CITES export purposes, may be authorized on a case-by-case basis if applicants are able to document the origin their roots (including source of seed or transplants).

In the Spring of 2006, we will re-evaluate the biological and management status of this species, including the outcome of various actions being taken at the Federal and State level, and will issue a new finding for ginseng harvested in 2006.

BASIS FOR ADVICE

1. To ensure that American ginseng (hereafter referred to as “ginseng”) remains viable throughout its range in the United States and to determine whether the export of ginseng will not be detrimental to the survival of the species, the Division of Scientific Authority (DSA) annually reviews available information from various sources (other Federal and State agencies, industry and associations, non-governmental organizations, and researchers) on the status and biology of the species. Therefore, this finding is based on the best available biological information on the status of the species.
2. Ginseng is a slow-growing, long-lived herbaceous perennial of the Araliaceae family. The

species is endemic to eastern North America, occurring from southern Canada (Ontario and Quebec), west to South Dakota and Oklahoma, and south to Georgia (Small and Catling 1999; NatureServe 2005). Although ginseng has a large geographic range, it occupies a narrow ecological niche, resulting in sparsely distributed populations across extensive areas (Lewis and Zenger 1983; Charron and Gagnon 1991; McGraw et al. 2003).

3. Below ground, ginseng forms a special underground stem, known as a vertical rhizome that sits on top of the main root from which grows the above-ground stem. The rhizome is characterized by large scars that form as a result of the annual loss of the single aerial stem. These annual stem scars can be counted to determine the age of the plant (Lewis and Zenger 1982). Ginseng's palmately compound leaves, also known as "prongs," can also be used to broadly determine the age of individual plants (Lewis and Zenger 1982; Charron and Gagnon 1991; Anderson et al. 1983; Lockard and Swanson 1998).
4. Recent research has shown that ginseng's genetic profile is consistent with a predominant life-history strategy of self-pollination, which results in low genetic variation within populations, but high genetic variation among populations (Grubbs and Case 2004).
5. Reproduction is by seed. Vegetative propagation (asexual) by rhizome or root fragmentation is possible; however, it has rarely been observed in the wild (Lewis 1988; Charron and Gagnon 1991). Ginseng has a low reproductive potential due to delayed reproduction (plants usually begin to reproduce by 4 years of age), low seed production, and high seed and seedling mortality (Carpenter and Cottam 1982; Lewis and Zenger 1983; Lewis 1988; Charron and Gagnon 1991, Anderson et al. 1983; Dunwiddie and Anderson 1999; Farrington in litt. 2005). Fruit production gradually increases with age-class (i.e., 2 fruits by 2-leafed plants, 1–9 fruits by 3-leafed plants, and 9–15 fruits by 4-leafed plants) (Lewis and Zenger 1982). Green fruits first appear in July and August and reach maturity in the autumn, when they turn red (Charron and Gagnon 1991; McGraw et al. 2005). The berry-like fruit is typically two-seeded (Lewis and Zenger 1983).
6. Empirical evidence shows that planting ginseng fruits (regardless of color) at the recommended depth of ca.1 inch (2 cm) in soil, versus scattering them on the soil surface or by the plant's natural passive dispersal, will significantly contribute to population recovery (McGraw cited in Van der Voort 2005). Moreover, seeds from red fruit germinate at 3 times the rate of seeds from green fruits (McGraw 2003).
7. Natural dispersal of fruits is passive. Fruits usually drop within 2 meters of parent plants (Lewis and Zenger 1982; Anderson et al. 1993; Cruse-Sanders and Hamrick 2004; Van der Voort 2005). Although ginseng seeds have been reported to be viable for up to 5 years in soil (Lewis 1988), the species does not form a long-term seed bank (Anderson et al. 1984; Lewis 1988; Charron and Gagnon 1991).
8. Ginseng has declined from historic levels and continues to be under threat from over-exploitation because demand and price for its roots remain high. A review of State harvest data (submitted annually by States to the Service) shows that, since the 1999 implementation of a 5-year minimum-age limit on ginseng roots, the number of wild roots

harvested has steadily increased. The data also indicate that there is a growing trend in the harvest of smaller roots, which indicates that fewer older plants are present in the wild.

9. There is a growing amount of empirical data that show a decline in the species' abundance and distribution in protected (e.g., National Park Service lands) and unprotected areas (harvest with authorization); that populations are small with predominately young plants (2-leafed plants); and that older seed-producing plants (3- and 4-leafed plants) are absent from many populations (Carpenter and Cottam 1982; Schlessman 1985; Rock et al. 1999; Spira, in litt. 1999; Charron and Gagnon 1991; Van der Voort 1998; Dunwiddie and Anderson 1999; Hackney and McGraw 2001; Gagnon 2003; Jones 2003; Kauffman 2003; Cruse-Sanders and Hamrick 2004; Furedi and McGraw 2004; Albrecht in litt. 2005; Farrington in litt. 2005; McGraw and Furedi 2005; Van der Voort 2005; Young et al. 2005). Diggers and dealers also report that ginseng is becoming increasingly hard to find, causing diggers to travel farther into forested and/or protected areas in search of ginseng (Greenfield and Davis 2003, Barringer 2005).
10. Studies on minimum viable population (MVP) size for ginseng are limited. An MVP of 172 plants was estimated for the species in the most northern portion of its range (Canada) and up to 800 plants in the southern portion of its range (West Virginia) (Nantel et al. 1996; McGraw and Furedi 2005). The lower MVP was based on the species' high fecundity rates in Canada, whereas in West Virginia, an MVP of 800 was based on the effects of deer herbivory on ginseng populations. In addition, Gagnon (2003) calculated an MVP of 500 for populations in the Great Smoky Mountains National Park (GSMNP), the largest Federally protected area for ginseng. However, populations of 172–800 individuals are rarely encountered anywhere.
11. The reduction in size of ginseng populations is of particular concern since research on the species indicates that small populations are vulnerable to the Allee effect (Hackney and McGraw 2001), which is a reduction in the fertility and survival of individuals once the population size descends below a critical threshold. Furthermore, small ginseng populations have reduced genetic variation (Cruse-Sanders and Hamerick 2004; Grubbs and Case 2004), which over time reduces the species' ability to survive and adapt to changing or variable environments. Population size is inversely proportional to the probability of extinction, because small populations are also more vulnerable to stochastic events.
12. Since fruit production is highly correlated with age, the decline in older, mature plants is also of concern since it results in a reduction in recruitment (Charron and Gagnon 1991).
13. The negative impact of ginseng over-harvest has been compounded in some States by white-tailed deer (*Odocoileus virginianus*) browsing. Research shows that repeated browsing of ginseng by deer can result in a decline in the percentage of mature plants that produce inflorescences (Drees 2003). Furthermore, in some areas, age structure of ginseng populations is being affected by the selective browsing of adult plants over seedlings and juveniles (Farrington in litt. 2005; McGraw and Furedi 2005).

14. Increased concern about the status of ginseng has led to the use of modeling and experimental testing to determine best harvest practices for the species. The available studies suggest that harvest of older plants significantly decreases the population growth rate (Charron and Gagnon 1991; McGraw 2003; McGraw and Furedi 2005; Van der Voort 2005). Furthermore, some States currently have a harvest start date before September 1 (i.e., Georgia, Illinois, Kentucky, Maryland, Pennsylvania, Tennessee, Vermont, and Virginia), which is too early to ensure that most fruits are sufficiently mature before harvest is allowed (McGraw et al. 2005).
15. Most States with wild ginseng harvest programs already have regulations in place that prohibit the harvest of plants with fewer than three leaves (that is, harvested plants must be at least 5 years old) and require the planting of seeds at the site where plants are harvested (Table 1). However, such regulations have proven difficult to enforce in the field.
16. The practice of using cultivated seeds to replenish and supplement existing wild populations can have negative impacts on wild populations (Grubbs and Case 2004; McGraw, in litt. 2004; E. Schlag, in litt. 2005). Grubbs and Case (2004) found that wild ginseng had over 2.5 times more genetic variation distributed among its populations than cultivated plants. The planting of cultivated and non-local genotypes into wild populations can reduce the fitness of progeny by diluting locally adapted gene pools, which over time may affect the long-term viability of the species (Grubbs and Case 2004; McGraw, in litt. 2004). Genetic research has revealed that wild ginseng plants are distinct from cultivated plants (Boehm et al. 1999; Schlag, in litt. 2005). In addition, cultivated ginseng seeds from commercial sources could be contaminated with fungal spores (e.g., *alternaria* fungus), which could infect wild populations (A. Hankins, Virginia extension specialist, pers. comm.).
17. Poaching of ginseng on U.S. Forest Service (USFS) and National Park Service (NPS) lands remains a chronic problem. Due to concerns about the decline of ginseng from over-harvest, the USFS Eastern Region prohibits the collection of ginseng on all National Forests (NF) except two (in Ohio and West Virginia), and continues to list the species on the USFS list of rare species (Regional Forester's Sensitive List) for nine eastern NFs. Although the USFS Southern Region has prohibited and restricted the issuance of ginseng permits on some of its NFs, over-harvest of ginseng has extirpated populations and reduced population sizes and age structure (Anonymous 2000; Sutter and Kauffman 2000).
18. Poaching on NPS lands (such as GSMNP, Mammoth Cave National Park, Shenandoah National Park, Blue Ridge Parkway, and Little River Canyon National Preserve), where collection of wild plants is completely prohibited, is of particular concern. Between 1991 and 2001, 11,654 illegally harvested ginseng roots were confiscated by GSMNP personnel (J. Rock, GSMNP, pers. comm.). To combat the illegal harvest of ginseng in national parks, the NPS has had to implement extreme preventive strategies, such as permanently marking ginseng roots and installing motion detectors or tracking devices (National Park Conservation Association 2005). Similar measures have also been implemented by the USFS in North Carolina in the NF adjacent to the GSMNP (G. Kauffman, USFS, pers. comm.). Therefore, previous assumptions that ginseng populations on these Federal lands

were protected or less susceptible to over-harvest are unfounded.

19. Earlier this year, the status of the species in Kentucky, which harvests the greatest amount of wild-collected ginseng, was changed from “apparently secure” to “vulnerable” by the State’s Natural Heritage Program. With the exception of Ohio, which has not yet assessed the conservation status of ginseng, none of the Natural Heritage Programs in the 19 States approved for export have designated ginseng as “secure” in their respective States (Figure 1).
20. The annual wild harvest amounts reported by the States to the Service greatly exceed the number of plants and population sizes used for conservation rankings assigned to ginseng by the State Natural Heritage Programs. This could be because amounts reported as “wild” are actually a mixture of wild, wild-simulated, and woodsgrown ginseng.
21. We are concerned about the amount of wild-simulated and woodsgrown ginseng reported as “wild” because there is a risk that false conclusions have been made that wild populations are not declining because of relatively stable harvest trends. Wild-simulated and/or woodsgrown roots are often visually indistinguishable from truly wild ginseng roots.
22. There is also increasing anecdotal information suggesting that some ginseng diggers are harvesting wild seeds and young roots to transplant to other locations, including their own property, for subsequent harvests or to sell as transplants. Many diggers remove, if not all, the majority of 2-leafed and larger plants from such sites (Nantel et al. 1996; Gagnon 1999). Moreover, dealers frequently find small pre-adult roots in batches they buy from harvesters (McGraw cited in Van der Voort 2005).
23. There have also been reports that some diggers harvest ginseng out of season (Robbins 1998; E. Burkhart, in litt. 2005, D. Taylor, USFS, pers. comm.). Additionally, States are reporting arrests for collection and/or possession of ginseng out of season.
24. Many long-time diggers say that the ethics of ginseng harvesting has changed and a new generation of diggers has emerged that may not have the same stewardship values to perpetuate the species (Robbins 2003; E. Burkhart, in litt. 2005). In addition, many harvesters may not know what the current regulations are, and for others, the State and Federal regulations have little or no influence on their harvesting practices (Robbins 2003; E. Burkhart, in litt. 2005).
25. It has been suggested that the sustainable harvest rate for ginseng is removal of 5–8% of a population, spread over each size-class of plants (Nantel et al. 1996; McGraw in litt 2003). However, without State-wide census data of ginseng populations, we believe that regulation of harvest at a targeted rate based on population size would be extremely difficult for States to implement and monitor.
26. We had previously found that the export of 5-year-old (3-leafed) and older wild ginseng plants from all of the States covered by our annual export finding was not detrimental to

the survival of the species based on the regulation of wild ginseng harvest by those States and other available information. However, based on the information cited in this finding, we now conclude that ginseng plants are not being given sufficient time to produce the amount of fruits (seeds) needed to sustain current harvest levels. In those States that allow harvest in August, the seeds are also not given sufficient time to ripen. Additionally, several States still do not require harvesters to plant seeds removed from harvested ginseng plants.

27. Therefore, based on our review of the best available information, we have determined that, to allow for sufficient production of seeds to contribute to future recruitment of plants into wild ginseng populations, more older plants must be retained in the wild. Therefore, we have concluded that the exports of wild ginseng harvested in 2005 will not be detrimental to the survival of the species, only if the following **CONDITION** is met:

Ginseng roots harvested in 2005 and certified by the States as **wild**, may be exported provided that the roots are from plants **10 years of age or older**. (Age of ginseng roots at the time of harvest can be determined by counting the number of annual bud-scale scars on the rhizome. A single scar is produced after abscission of the plant's aerial stem each year.)

Future Actions

In preparation for making our non-detriment finding on exports of wild ginseng in 2006, 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 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 plan to meet in early 2006 with the States and other Federal agencies as well as hold a public meeting.

We will also evaluate the following information for our finding in 2006:

1. A predictive habitat model for ginseng in five States (Kentucky, Ohio, Tennessee, West Virginia, and Virginia) developed by the U.S. Geological Survey–Biological Research Division. The model will be used to estimate the potential distribution and abundance of ginseng based on habitat suitability. It will also include field census data on the size and structure of populations surveyed. The project will be completed in January 2006.
2. The outcome of the ongoing review of the status of *Panax quinquefolius* by State Natural Heritage Programs and NatureServe.
3. Publication of the long-term monitoring results for ginseng in the Great Smoky Mountains National Park, and the USFS Eastern Region Conservation Assessment of ginseng. Upon completion of the USFS Conservation Assessment, we will consult with the USFS to determine what effect their report may have on the management of ginseng

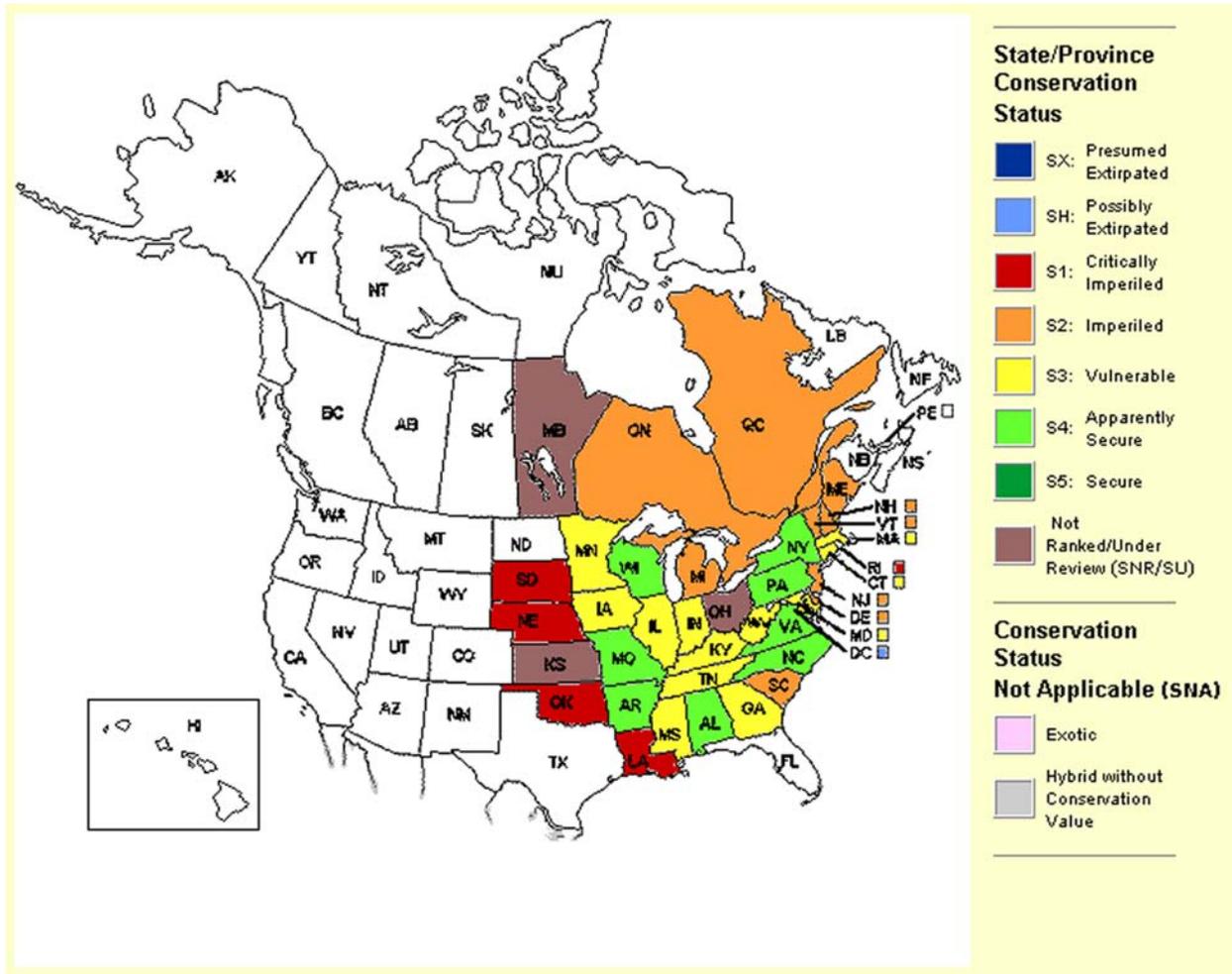
on those NF lands, in particular those in Ohio and West Virginia where harvest is still allowed.

4. We will continue to 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 terms.
5. 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 all States adopt minimum-age or -size requirements for harvest, that are consistent with the minimum-age requirement for export. We will also encourage the States of Illinois, Indiana, and Virginia to require harvesters to plant the seeds of harvested ginseng plants at the point of harvest.
6. We will consult with Georgia, Kentucky, Maryland, Pennsylvania, Tennessee, Vermont, and Virginia to encourage those States to revise their ginseng harvest season start dates to coincide with when ginseng fruits are actually known to be mature (red) in those States.
7. To improve our analysis, we will continue to encourage all States to report harvest data by county, and to include dry-roots-per-pound averages 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.
8. We will continue to discuss with the States the use of non-local or “commercial” seed for replanting of ginseng in the wild. We support and encourage the planting of wild ginseng seeds where they are harvested. Based on recent scientific literature, we do not support the planting of “commercial” or non-local seed to augment and/or restore native wild populations. We are greatly concerned about the origin of ginseng seeds used for restoration purposes and the impact of non-local seed on local gene pools of wild populations. This is of particular concern where the species is less common, and where random planting of non-local seed may have an even greater adverse effect on ginseng populations.
9. We will consider and discuss with the States and Federal land management agencies what other effective conservation measures that can be implemented to ensure the long-term survival of ginseng.

Table 1. 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	First Saturday in Sept. - Nov 1	no, but encouraged	no requirement
Indiana	Sept 1 - Dec 31	no, but encouraged	3 prongs, a flowering or fruiting stalk, or 4 internodes on root
Iowa	Sept 1- Oct 31	yes	3 prongs
Kentucky	Aug 15 – Nov 30	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
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	Sept 1 - Nov 30	yes	3 prongs
Wisconsin	Sept 1 – Nov 1	yes	3 prongs and mature fruits

Figure 1. Map of American ginseng's range and conservation status rank in the United States and Canada (NatureServe 2005). Available at URL:<http://www.natureserve.org/explorer/>.



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