CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

Other proposals

A. Proposal: Include *Hydrastis canadensis* in Appendix II, in accordance with Article II, paragraph 2(a).

Excluded are those parts and derivatives (such as the seeds) that are specified as the standard exclusions (*cf*. Resolutions Conf. 4.24 and Conf. 6.18). See also Section 7 below.

B. Proponent: United States of America

C. Supporting Statement

1. Taxonomy

1.0. Division Magnoliophyta (angiosperms; flowering plants)
1.1. Class Magnoliopsida (dicotyledons)
1.2. Order Ranunculales (Ranales)
1.3. Family Ranunculaceae (buttercup family),
subfamily Hydrastidoideae

The genus *Hydrastis* Ellis *ex* Linnaeus is sometimes classified elsewhere, for example in the monotypic family Hydrastidaceae, or in the segregate family Glaucidiaceae (a summary is in Cronquist 1981). Firm decisions involving the familial placement of this genus may need a molecular study involving Berberidaceae, Ranunculaceae and related families (B. Ford, Flora North America, online 1996).

1.4. Scientific name: *Hydrastis canadensis* Linnaeus, 1759

1.5. Scientific synonyms: None in use. This species was named by Linnaeus in the *Systema Naturae*, 10th edition (1759); its nomenclature has remained stable since the late 18th century.

1.6. Common Names

1.6.1. English and Historic: The common name by which this species is best known is **goldenseal**, presumably on account of the cuplike scars of previous annual stems on the rhizome, which are bright yellow or golden in color and resemble the wax seals once used to seal envelopes (Catling and Small 1994, Lloyd and Lloyd 1884-1885 in Foster 1991). Other names (variously spelled) for this species are orangeroot, yellow puccoon, ground raspberry, eyebalm, eyeroot, Indian paint, yellow paint, Indian dye, goldenroot, Indian turmeric, wild turmeric, jaundiceroot, yelloweye, Ohio curcuma, and wild curcuma (Henkel and Klugh 1904, Foster 1991). The consistent use of the name goldenseal dates
to the Thomsonians, who were adherents of the medical system of Samuel Thomson, 1769-1843 (Foster 1991). In trade, it has sometimes been referred to as yellowroot, a general name which can include several species such as *Xanthorhiza simplicissima* (shrub yellowroot), *Coptis trifolia* (goldthread) and *Stylophorum diphyllum* (wood-poppy).

1.6.2. Other European Languages:

Golden Seal, Yellow root (British English)
Sceau d'or, hydraste (French)
Kanadische Gelbwurz, Orangenwurzel (German)

Idraste, Sigillo aureo (Italian)
Hydrastis Kanadsky (Russian)
Sello dorado (Spanish)

1.6.3. Pharmaceutical Names:

H (canadensis)
Rhizoma Hydrastis (canadensis)
Herba Hydrastis canadensis
Goldsiegelwurzel (German)

2. Biological Parameters

2.0. Description

Hydrastis canadensis (also referred to as "goldenseal" hereafter) is a perennial herb which measures 20 cm to 50 cm high and has a horizontal, irregularly knotted, brownish (internally bright yellow) underground structure of rhizomes (ca. 6-19 mm or ¼-¾ inch thick) attached to slender roots and marked with scars of flower stems from previous years. This small, delicate, inconspicuous plant produces only 1 to 2 palmate, 5-9—lobed leaves on a single erect, hairy stem.

The single greenish white flower emerges from the center fully formed as the leaves unfold, at a height the same as or lower than the leaves. The flower is conspicuous only by its numerous white stamens. Flowering time is in early spring and the flower persists for a short duration, typically lasting only a few days. By mid-summer to early fall, a round (ca. 1.7 cm across) fleshy fruit appears which consists of a crimson berry aggregate, suggesting the occasionally used common name "ground raspberry". The fruit however is inedible to humans. Seeds are 2.5 mm in size and a shiny deep black or brown. Soon after the berries mature, plant senescence begins for the winter months. Senescence timing appears to be highly dependent upon soil moisture content (Kauffman 1996). Natural reproduction is through both seed and rhizome division.

The thickened knotty rhizome (usually 4-7 cm long and 0.5-2 cm wide) provides vegetative spread of the species. The rhizome is dull brown on the exterior, with a bright yellow pigmented interior. A new bud is produced on the rhizome in late summer or early autumn. This bud will produce a stem during the next growing season. Alkaloid content in the underground structures is highest when dug in the fall. Root growth occurs after the fruit matures, as does the development of new individuals from the rhizomes (Eichenberger and Parker 1976). The yellow-pigmented, strong-smelling rhizome is the source of important medicinal alkaloids and is the part generally marketed for medicinal purposes, although leaves are also sometimes used.

2.1. Distribution (maps in Annex 1)

Hydrastis canadensis is native to the nutrient-rich mesic hardwood forests of North America. It is an associate of a complex herbaceous flora including other species of medicinal importance, most notably ginseng (*Panax quinquefolius*) and bloodroot (*Sanguinaria canadensis*). Little information is available on the life history and population biology of this species within its native habitat.

Occurrence is infrequent though its broad historical range encompasses the following 25-27 U.S. states (see Table 1 and Annex 1): Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, (Kansas), Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New York, North Carolina, Ohio, (Oklahoma), Pennsylvania, Tennessee, Vermont, Virginia, West Virginia and Wisconsin. The species also occurs in the Province of Ontario, Canada. The core of the present range consists of eastern Kentucky, Ohio, Indiana and Illinois. Any statement about number of occurrences is speculative since no state has precise comprehensive figures on the number of populations. None of the states currently monitor

this species. Goldenseal is presently cultivated to a limited extent within its historical range as well as in Oregon and Washington. (Kauffman 1996).

2.2. Habitat Availability

This species favors moist rich woodland habitats in hilly, canopied areas. Individuals may be found in distinct clumps, constituting a single population, and are usually aggregated with greatest concentration in the interior area of the undisturbed woods rather than along the edges (Eichenberger and Parker 1976). However, the availability of suitable habitats for this species has been declining due to loss of undisturbed woodlands by expansion of agricultural land, timber production, road intrusion, urbanization, disruptive wild-collecting of plants, as well as foot trampling and other recreational uses of public lands. As early as the 1800s, there were reports that habitat destruction was severely impacting wild populations (Lloyd and Lloyd 1884-1885, in Foster 1991).

West Virginia is the only state that in response to this potential proposal has reported an increase in woodlands and climax forests and presumes an improvement, rather than degradation, of goldenseal habitat. In 1910, only 35-40% forested land was left in this mountainous region; today the percentage has increased to 80% woodland.

2.3. Population Status

Native Americans sustainably harvested goldenseal for medicinal purposes over centuries. However, with Euro-American timber harvesting, settlement, and development of substantial medicinal plant trading in the 1800s, habitat destruction and collection for sale began to severely impact wild populations. These forest ecosystems have been changed, and *Hydrastis canadensis* as a wild-functioning species, in particular, now exists only as remnant populations.

The decline to rarity of this species has been reiterated by numerous authors including Millspaugh 1887, Henkel and Klugh 1904, Lloyd and Lloyd 1908, Grieve 1931, Deam 1940, Fernald 1950, Hill 1952, Gleason 1968, Schery 1972, Wofford 1989, Catling and Small 1994, Elliott 1995 and Foster 1991, 1995.

In the United States, goldenseal is native in ca. 27 states (see Table 1 below) (*cf*. Kartesz 1996). In 17 of them it is considered critically imperiled, imperiled, or uncommon; 4 other states report some rarity (TNC 1995), and no state considered goldenseal as common. The species is rare along the edges of its range (*e.g*. in Connecticut and Delaware) due to the absence of suitable habitats (*cf*. Crow 1982). In North Carolina for example it is listed as an endangered species and harvest from the wild is prohibited (Davis 1995).

Goldenseal is designated as threatened within Canada by COSEWIC (Committee on the Status of Endangered Wildlife). A designation of threatened was confirmed by the Committee on the Status of Species at Risk in Ontario (COSSORO) in 1995 (Dauphiné 1996, pers. comm.), the only Canadian Province in which it is native. In 1995 there were about eight recently verified sites, and five historic sites where the species had been extirpated.

Goldenseal is particularly susceptible to "non-destructive intrusion" and has been assigned a fragile ranking by the Network of Natural Heritage Programs because the rich, mesic soils in which it occurs are easily subject to alteration by soil compaction (The Nature Conservancy 1996).

Table 1

State/Province	Status
Alabama	Imperiled
Arkansas	Reported, No rank
Connecticut	Critically Imperiled
Delaware	Uncommon
Georgia	Imperiled
Illinois	Some Rarity
Indiana	Uncommon
Iowa	Uncommon
Kansas	Reported
Kentucky	Some Rarity
Louisiana (* Likely not native)	Reported, No further information
Maryland	Critically Imperiled
Massachusetts	Critically Imperiled
Michigan	Imperiled
Minnesota	Imperiled
Mississippi	Critically Imperiled
Missouri	Relatively Common
Nebraska (* Likely not native)	Reported, No rank
New Jersey	Historical reports
New York	Imperiled to Uncommon
North Carolina	Imperiled
Ohio	Reported
Oklahoma	Uncertain
Pennsylvania	Some Rarity
Rhode Island (* Evidently not native)	Not reported
Tennessee	Uncommon
Vermont	Critically Imperiled
Virginia	Uncommon
West Virginia	Some Rarity
Wisconsin	Uncommon — Some Rarity
Canada: Ontario	Imperiled

Key (TNC 1995, U.S. FWS 1996):

Critically Imperiled: 5 or fewer occurrences, fewer than 1,000 individuals

Imperiled: 6-20 occurrences, fewer than 3,000 individuals

Uncommon: 21-100 occurrences, fewer than 10,000 individuals

Some Rarity: 100 occurrences or more

2.4. Population Trends

In the latter 1800s goldenseal suffered dramatic decreases in abundance due to over-harvesting for the commercial trade. Once abundant populations were decimated, and the distribution of this widespread species was reduced to isolated, scattered patches (*e.g*. Lloyd and Lloyd 1884-1885, in Foster 1991; Henkel and Klugh 1904). The species has been assigned the most threatened ranking in the Nature Conservancy's database (TNC 1996), where it is classified as "very threatened rangewide."

Because of an escalation of demand for the plant in the commercial and international medicinal plant markets, goldenseal ranks next only to American ginseng (*Panax quinquefolius* Linnaeus) as a native species of value on the medicinal plant market. As a whole this market has experienced in excess of a 30% growth rate in the last 2 years alone, and the demand for this species also in excess of 30%. Goldenseal from wild populations is generally considered preferable, and most products which advertise goldenseal content are explicit about it being wildcrafted as a sales incentive (*e.g*. tinctures are often labelled "wild American goldenseal" or "harvested from the wild in the Appalachian Mountains") (Bannerman 1997).

Since cultivation takes a minimum of 3 years, even with root propagation, harvesting from the wild has not only brought higher prices (in many instances), but also represents a quick financial return. The result of over-collection, coupled with the various habitat degradations cited above, have accelerated population decline.

In the Southern Appalachian Mountains, only one population is reported for the entire large Great Smoky Mountains National Park. According to a NP biologist, "Several years ago we noticed a leaf blight and had it identified by the University of Tennessee Agricultural Extension Service as *Streptobotrys streptothrix*. I would say our population is just "hanging on due to this fungus" (Rock 1996, pers. comm.). A controlled winter burn is being instigated in an experimental attempt to destroy the pathogen before the new stems emerge in the spring.

Goldenseal occurs on U.S. National Forest System public lands where it suffers from habitat problems and is heavily collected. The U.S. Forest Service has stated (20/11/96) that "Current conditions suggest [it] cannot be traded in perpetuity unless conservation of the species improves." *Hydrastis canadensis* is found in the Southern and Eastern Regions (8 and 9) of the U.S. Forest Service. According to its Wildlife, Fish and Rare Plants Staff, "Entire populations are known to disappear once they are discovered due to collection pressure. The literature indicates that the plant is becoming increasingly harder to find in areas where it once flourished." It is already on a U.S. Forest Service sensitive species list.

A well-known naturopathic physician, researcher, and gatherer of his own medicinal plant materials, pointed out: "The condition of Golden Seal is DISASTROUS these days. Most of what is on the market is being illegally poached from the grimly diminished wild populations, since the floods and heavy precipitation of the last couple of years have ruined a large part of the Golden Seal that was in cultivation. ... EVERY ... STAND of Golden Seal that I coppiced for years in the Missouri and Arkansas Ozarks (I use primarily the secondary leaf ...) has been wiped out in the last four years. Three years ago I found perhaps a dozen plants that still survived in SEVEN localities in SIX counties in TWO states. There had been thousands the year before." (Moore 1996).

Another seasoned herbologist recently wrote, "I found not a single plant of wild goldenseal last summer, despite rambling and foraging at least 400 miles last summer on foot through some of the most remote mountainous areas of the Northeastern US. I found a few ginseng plants, quite a few wild orchids, but not ONE specimen of goldenseal."

2.5. Geographic Trends

The species has a wide native distribution, although it is considered uncommon and continuing to diminish nearly throughout its range. Its restricted natural distribution was "only ever abundant in a limited area in the central part of its range in the states of Indiana, Kentucky, Ohio, and West Virginia" (Catling and Small 1994).

From a few scattered, remnant populations along the eastern slopes of the Appalachian mountain range, the geographic distribution improves westward to its core in eastern Kentucky, Ohio, Indiana and Illinois. However, none of these states currently monitor this species. For example, in Kentucky where goldenseal may still be present within a large number of counties, the current quantity and quality of these populations is unknown (D. White, Kentucky Heritage Commission, pers. comm.). Field researchers in Kentucky observe a population decline in recent times due both to habitat modification and rootstock over-collection (Kauffman 1996).

Goldenseal has been located within nine counties in North Carolina although most populations are quite small (J. Amoroso, North Carolina Natural Heritage Program). The state has classified *Hydrastis* as endangered, thereby prohibiting the collection and sale (except from cultivated sources with permit). But as enforcement capabilities are limited from lack of funds and personnel, people may continue to collect from the wild and the populations continue to decrease (Bannerman 1997).

Throughout its range, different geographic populations may hold genotypes which have variances in blight and drought resistance, alkaloid content, *etc*. Therefore, the geographic distribution of the populations is of critical importance. Given the broad range of the species, it may become helpful to split analysis of geographic trends into three distinct areas: (1) the southeast, (2) the central Midwest heartland, and (3) the northern periphery.

2.6. Role of the Species in its Ecosystems

Hydrastis canadensis is a woodland herbaceous perennial (*cf*. Eichenberger and Parker 1976). Although a small relatively slight plant above ground, its spreading underground rhizomatous structure, along with the high content of antimicrobial alkaloids contained therein, may suggest a symbiotic role with other species, as well as soil health, within its ecosystems.

Diverse animal species may utilize the berries and rhizomes to nutritional and therapeutic ends; however, further research is needed to determine the extent, significance, and interactivity of goldenseal in this regard. For example, various avian species may have a role in seed germination and distribution as they utilize the berries. The appearance of new goldenseal clusters and the rapid disappearance of ripe fruit suggest that animals are the primary dispersal agents. The fruit of goldenseal turns bright red and sits atop the plant, pointing to its attractiveness to birds (Eichenberger and Parker 1976).

Seeds are harvested by ants and carried back to be stored in the cool earth, where the ants feed on the fat body of the seed and then expel the seed core. There is an implied correlation between this process and seed germination (Clebsch 1996). Further insect-focused ecological studies are warranted, especially since the role of insects in other processes such as pollination, and conversely, the role of the plant species in the vigor and life cycles of insect populations, have yet to be delineated.

Insect and mammal predation also require further investigation. Herbivory by slugs has been cited for a population with only three vegetative plants. It is not known whether insects select for smaller and weaker populations or are a mechanism for the reduction. Groundhog digging which resulted in a site with only two immature plants growing amidst uprooted plants has also been observed (P. Somers, state botanist for Massachusetts).

2.7. Threats

The wild populations of this species have decreased from its historical known population levels, and it is being

severely diminished across its range by factors such as timber production, expansion of agricultural land, road intrusion, urban development, animal disturbance (groundhog digging and slug herbivory have been cited — MacCallum, Massachusetts, *in litt*. 1996), and forest degradation due to environmental factors including blight, air pollution, and foot/vehicular traffic in more remote areas open for recreation.

The species has been assigned the most threatened ranking in The Nature Conservancy's database (TNC 1996), where it is classified as "very threatened rangewide; species directly exploited or threatened by natural or man made forces."

The humus-rich, leaf-littered soils where goldenseal occurs are easily compacted and therefore fragile, subject to many kinds of disturbance. In addition, plant poachers seeking ginseng,
as well as goldenseal, sometimes destroy or seriously disrupt swaths of habitat in hasty and ill-considered attempts to illegally harvest root and rhizomatous material. In addition to the root material, "goldenseal herb", the dried leaf of the plant, is also sold medicinally in stores and via the Internet's World Wide Web in vague categories such as "popular during the winter season". Given that a single plant produces only 1-2 small, deciduous leaves, any estimates of figures for numbers of plants required to harvest and trade in pound or tonnage amounts is, of necessity, staggeringly large and apparently cannot be sustained simply by utilizing the germplasm reserve of the declining wild supplies.

3. Utilization and Trade

3.0. Categories of Utilization

Historically, goldenseal has been utilized by Native American peoples including the Cherokee, Crow, Iroquois, Meskwaki, Seminole, and Blackfeet. The repertoire of uses has included those of medicine (with diverse applications, including the treatment of cancer and arrow wounds), tonic (for seasonal changes), dye (due to its deep yellow color), face stain (cosmetic), and insect repellant (mixed with bear grease).

By the early 1800s, goldenseal was a popular remedy for immigrants who had learned to use it from the Native Americans. Almost 150 tons of the root were being collected in 1905 (Mills 1994, Barton in Foster 1991). In 1831, it was listed in the United States Pharmacopoeia and later in the U.S. Formulary. Besides the United States Pharmacopeia, goldenseal has been recorded in at least 13 others including the French Pharmacopeia (Genest and Hughes 1969), as well as in homeopathic materia medica.

Goldenseal is also used in preparations of veterinary herbal medicine. It holds promise for conditions related to environmental stressors and bacterial contamination in captive animals, as well as for pets. It has been reported to have been successfully used in canine fungal ear infections, as well as in accelerated wound healing (Bannerman 1997).

Today, goldenseal's value in trade is almost wholly medicinal, with sophisticated applications in both human and veterinary medicine. Its use as a rotational crop on ginseng plantations has increased the health of the ginseng populations by disrupting the life cycle of soil pathogens which destroy or deform ginseng roots. It is difficult to grow ginseng in the same location twice due to disease such as leaf blight and root rot, which are eradicated during the goldenseal rotation. Additional soil additive uses may be suggested by such an application.

3.1.1. National Utilization as Botanical Medicine

Hydrastis canadensis has so many reputed medicinal uses that it is difficult to get a clear perspective on the breadth of present uses and trade. The plants most active constituents are the rootstock's three predominant alkaloids: berberine, hydrastine and canadine, as well as other minor alkaloids and chlorogenic acid (Shideman). It is because of the combination and interactivity of these compounds that goldenseal is considered to have such wide-ranging medicinal value. Further, goldenseal is considered a synergistic or carrier herb which increases the efficacy of other medicinal plant compounds; it is therefore included in hundreds of multi-herb preparations, especially those which also include *Echinacea* (Bannerman 1997).

A number of scientific studies point to the efficacy of these compounds, and their synergy, for a number of

medical conditions, in particular as an antimicrobial, antiparasitic, antihemmorhagic and bile stimulant (Bradley 1992, Benigni *et al*. 1962, Liu 1991, Kaneda 1991, Sun 1988, Sack 1982).

Goldenseal is also purported to have astringent properties due to the action of the alkaloid hydrastine, thereby affecting mucosal surfaces internally and externally, including mouth and gum disorders, eye afflictions, infected wounds and inflamed skin conditions (Mills 1991). In the 19th and early 20th centuries, these were considered the primary benefits of *Hydrastis*.

Discovery of an even more promising phytopharmaceutical property has to do with the action of the berberine content of goldenseal as an antimicrobial and antiprotozoal, down to very small dilutions of 1:6000 (Mills 1991). Due primarily to the presence of berberine, goldenseal further acts to inhibit the adherence of bacteria to host cells. Berberine exhibits wide antibiotic activity (sometimes exceeding commonly used antibiotics) against bacteria, protozoa and fungi (including *Candida albicans, Staphylococcus* spp., *Streptomyces* spp., *Chlamydia* spp., *Escherichia coli, Salmonella typi, Vibrio cholera, Diplococcus pneumoniae, Pseudomonas* spp., *Shigella dysenteria, Neisseria gonorrhoeae* and *N. meningitidis, Giardia lamblia, Leishmania donovani* and others. Berberine also prevents yeast overgrowth, a common side effect of antibiotic use (Murray 1995).

Goldenseal is also widely used in infectious diarrhea, including traveler's diarrhea, food poisoning, giardia and cholera, having both antimicrobial activity and the ability to block the action of toxins produced by certain bacteria (Murray 1995).

The berberine alkaloid in goldenseal increases blood supply to the spleen and activates macrophages, both significant immunostimulatory activities (Sabir and Bhide 1971, Kumazawa *et al*. 1984, in Murray 1995). For all these reasons, goldenseal is in demand by many consumers with severe chronic diseases, and most particularly, those patients with AIDS. In a survey of AIDS/HIV-affected patients using local health food stores, goldenseal was one of the products most purchased, and most recommended by store employees for customers with AIDS (Medicial Sciences Bulletin 1995).

3.1.2. National Trade as Botanical Medicine

In a 1993 survey, the American Herbal Products Association (AHPA) found that over 90% of its member businesses contacted in the United States and Canada were already marketing goldenseal. In 1995, goldenseal was one of the five top-selling herbs in a survey of 163 health food stores, with goldenseal and four other top-selling herbs constituting 37.1% of all individual herb sales (*Whole Foods* magazine survey as cited in Brevoort).

According to the American Herbal Products Association, during the period 1990-1992, a total of 1.3 million pounds of goldenseal were sold by their members. This figure is likely to be an underestimate as it is based on information provided by only 37 of the AHPA's 163 members. On the other hand, this overall figure may include secondary sales from one company to another, which may overstate the amount of the reported goldenseal consumed. Nonetheless this amounts to in excess of 260 million roots potentially traded between 1990-1992 alone since it takes approximately 200-250 rhizomes to make 1 lb dry weight (Veninga and Zaricor 1976).

Since 1992, herb products have constituted the top growth category in American drugstores (Foster 1996). Passage in 1994 of the U.S. Dietary Supplement Health and Education Act (DSHEA) further defined herbs as dietary supplements and thereby established a mass market for herbal medicine such as goldenseal. Now a wide spectrum of products containing goldenseal can be found at all national chain drugstores, major discount department stores, highway convenience stores, health food stores, and in a proliferation of mail-order businesses.

In 1994, the U.S. medicinal herb industry was estimated to be in excess of US$ 1.6 billion, with a healthy growth rate in the two years hence (Brevoort). From 1996 to the year 2000, the American market for herbs such as goldenseal sold as dietary supplements is expected to increase, conservatively, by at least 400% (Foster, *in litt*. to Bannerman 1996).

In 1996, the wholesale price for goldenseal is reported to have topped US$ 100 per pound for the first time (Foster 1996, pers. comm.). Average price per pound wholesale is US$ 40-80 lb, a notable increase in value compared to US$ 18/lb in 1992 (Kauffman 1996). The 1995 wholesale prices of goldenseal and its derivatives are listed in Table 2. Retail prices for bulk powder are currently averaging US$ 130. Prices are higher when purchased by consumers in small quantities as tincture, capsule powder or as an extract additive. In the new 1997 catalog of one of the largest North American herbal suppliers, dried whole roots are selling for US$ 268/lb (Bannerman 1997).

Table 2

1995 Wholesale Prices of Goldenseal (*Hydrastis canadensis*) Marketed in the United States

Form/Product	Price (US$)	Source	Origin of Sale
Tincture	7.85	N/A	Oregon
Root	65.00/lb	Wild	California
Root (powdered)	68.00/lb	Wild	California
Extract	18.95/ounce	N/A	Florida
Capsules	24.95/100 caps.	N/A	Florida
Leaf & Stem (cut only)	1.50/ounce	N/A	Michigan
Root (cut or powdered)	5.00/ounce	N/A	Michigan
Herb Tea	5.56/2 ounces	N/A	New York
Liquid	17.82/2 ounces	N/A	Pennsylvania
Powdered Root	63.65/1-4 lbs	Wild	Iowa
Powdered Root	30.15/1-4 lbs	Organically grown	Iowa
Root Capsules	9.19/100 caps.	N/A	North Dakota

Source: As presented in 1995 U.S. herbal catalogs.

3.2. Legal International Trade

The Food and Agriculture Organization (FAO) of the United Nations cites goldenseal as one of the best-selling herbs internationally (USA Country Report in Dennis 1996). In 1905, the annual supply of goldenseal was estimated at from 200,00 lb to 300,000 lb, about one-tenth of which was exported (Grieve 1931). If the weight of roots exported to international markets between 1994-1995 are tallied using the data from USDA-issued phytosanitary certificates (see Table 3), as many as 6,368,400 roots may have been traded from 1994-1995.

Hydrastis canadensis is recorded in the official pharmacopoeias of France, Britain, Germany and Italy. It is also listed in
the German Homeopathic Pharmacopoeia. Its use in Europe can be traced back as far as 1883 when it was popularized by the studies of Schatz (Oddo, Lange and Dennis 1996). *Hydrastis* is considered extremely expensive by all the European traders and processing companies, and due to its high prices and relatively low requests it is not always profitable. An increase in the price was noticed in the United Kingdom at the beginning of the 1990s.

Hydrastis, like many other medicinal plants, is not specifically identified by a commodity code; therefore it is not possible to obtain any information from the usual foreign trade statistics. At present, the trade in goldenseal is for the most part unregulated, and export permits are not required for the exportation of goldenseal from the United States. However, some data on volume of recent goldenseal exports are available from 1994-1995 phytosanitary certificates issued by the U.S. Department of Agriculture (USDA). According to these certificates, nearly 11,200 lbs of dried goldenseal roots from Kentucky were exported from Georgia (Atlanta) to Italy in 1994. In 1995, over 4,700 lbs of goldenseal also originating from Kentucky were exported to Italy. In 1995, two phytosanitary certificates were issued for goldenseal in Saint Louis, Missouri, and over 1,400 lbs of goldenseal roots were exported from Wisconsin (Milwaukee) in 1995. See Table 3 for

a summary of the 1994-1995 reported exports of goldenseal.

Table 3

Goldenseal Root Export Data from U.S. Department of Agriculture				
Date	**Port of Export**	**Source or Origin**	**Destination**	**Quantity (lbs.)**
9/95	Atlanta, GA	Kentucky	Milan, Italy	4,717
9/94	Atlanta, GA	Kentucky	Milan, Italy	2,203
8/94	Atlanta, GA	Kentucky	Milan, Italy	4,484
3/94	Atlanta, GA	Kentucky	Milan, Italy	4,505
10/95	St. Louis, MO	Kentucky and Missouri	Canada	500
10/95	St. Louis, MO	Kentucky and Missouri	Canada	3,380
11/95	Milwaukee, WI	Wisconsin	Toronto, Canada	1,053
9/95	Milwaukee, WI	USA	Toronto, Canada	385

Source: Phytosanitary certificates issued by the Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture (USDA).

TRAFFIC USA has been advised by an agricultural research and development firm in the United Kingdom that an estimated 10 metric tons of goldenseal, valued at US$ 1.55 million, may be traded globally each year (Dennis 1996). This is a conservative figure and may not reflect the amount of goldenseal actually traded in the United States nor used locally (Agros Associates *in litt*. to TRAFFIC USA 1996). TRAFFIC reports a study showing that goldenseal is marketed in over 117 medicinal products worldwide, with Germany accounting for 57% of the products and France for 30% of the products marketed in Europe.

As a homeopathic remedy, it is rather commonly used and appears as a component in at least 300 remedies. *Martindale: The Extra Pharmacopoeia* electronic database (Reynolds 1996) lists 18 products, mainly homeopathic, produced in France, Germany, United Kingdom, Switzerland, Spain and Australia (Oddo, Lange and Dennis 1996). The headquarters of three large homeopathic companies (Boiron, Dolisos, Lehning) are located in France, where they both process and export mother tinctures, dilutions and finished products (Oddo 1996).

Export statistics suggest that a large portion of the exported crop goes to Milan, Italy (see Table 3) which has the largest natural-products extractor industry in the world. Once processed, the material is available to the global market, including North America. Like Germany, *Hydrastis* is common on the Italian market primarily as a homeopathic remedy, rather than a phytopharmaceutical, with approximately 150 remedies marketed (Oddo 1996). The largest Italian herbal trade company reports that they usually receive one shipment a year and process the plant to obtain a dry extract which is mainly exported back to the U.S. market. Another company processes small quantities of *Hydrastis* mainly for re-export of tincture to the United States and North Africa. In Italy the dried rhizome is greatly more expensive than other medicinal plants, with prices between US$ 50-100 per gram (150,000 It£/kg) (Oddo 1996).

According to the Medicinal and Aromatic Plant Conservation Information System (MAPCIS) databased maintained on medicinal plant imports into Germany, goldenseal is readily available on the German market, as well (Schippmann 1995). In Germany, goldenseal is listed in the catalogs of at least six wholesale traders, with prices ranging from 22 DM/kg for leaves and stem to 150 DM/kg for dried rhizome (Oddo *et al*. 1996). However, it is impossible to get detailed information about exact trade volumes since many companies would not give out any information about trade. A German database of phytopharmaceuticals reported 43 pharmaceutical companies selling 176 different remedies using goldenseal (Lange-Osten 1996). U.S. pharmaceutical companies purportedly export some goldenseal to Germany for processing (Mater 1993).

Sales of *Hydrastis* in the United Kingdom are reported to be in the region of 2,500 kilos per year. Most material is traded in tablet and capsule form, with a content of approximately 520 mg of ground *Hydrastis* root each and retailing for approximately £10 for a bottle of 50. One popular U.K. apothecary considers *Hydrastis* to be their fourth most popular tincture and estimates that they sell some 15 litres per year (Dennis 1996). Another company reported that sales have been increasing over the last 8 years with a 50-60% increase in sales during 1995-96 (Dennis 1996) due primarily to attention in the press.

Also in the United Kingdom, one commercial chain considered their goldenseal tincture to be the fourth most popular tincture in sales. Another company in the United Kingdom considered goldenseal to be one of the more important Western herbs, even though it was a small part of their overall business. Overall, R. Coinstandouros (of Agros Associates) estimated that the annual volume of *Hydrastis* entering the United Kingdom is approximately 10 tonnes with an estimated value of US$ 1.55 million. At a minimum of 200 roots to the pound, that 10-tonne import amount for the United Kingdom alone suggests a staggering annual harvest. It was clear from companies surveyed that even the slightest public promotion has an immediate effect on popular demand, citing that the much publicized Here's Health awards of 1996, given to the Solgar goldenseal product, resulted in an immediate and substantial rise in retail sales (Dennis 1996).

After goldenseal is processed by European countries, it is re-exported to other countries, including North America, the Caribbean, and North Africa (Oddo 1996). Companies from the United Kingdom, Germany, France and Italy are involved in the re-export business and cite, in particular, a good trade in the Caribbean where it is used medicinally.

Traders could not specify whether the material they bought was from cultivated sources or wild harvested and generally expressed little interest in the conservation of the species, relying entirely on market forces to dictate sales and predictions. The retail market also appeared to be unaware of conservation issues (Dennis 1996).

With the advent of electronic sales, nationally and internationally, via the World Wide Web, the market for goldenseal is expanding in unpredictable ways. In this medium, it can be recommended and advertised for various medical conditions and this may increase market demand in unprecedented ways. One Internet search turned up over 50 companies advertising and selling goldenseal in this way (Brown 1996).

3.3. Illegal Trade

There is no organized or reported monitoring of wild populations in the United States or Canada. Reports of illegal collection from public and private lands are widespread but anecdotal.

For example, according to the Minnesota Department of Natural Resources' botanist, decline in that state is due not only to habitat loss, but also to "illegal harvesting by root diggers." Throughout its range, herbal traders purchase *Hydrastis* bulk and rely on the seller to declare the source of supply and method of harvest. However, there are no mechanisms to certify or ascertain sources cited (Bannerman 1997).

In North Carolina (as another representative example, in a state with an extensive program for rare species), the species is at the edge of its range and listed as endangered, but there are

no particular monitoring mechanisms against illegal harvesting. There is no systematic protection on public lands, and officials are hesitant to organize further protection programs which would make public the locations of goldenseal (and therefore similar species such as ginseng) (Bannerman 1997). Poachers make use of such information to target illegal collection, especially in places like the Great Smoky Mountain National Park. The usual state penalty for a first offense of taking goldenseal from the wild is US$ 100 (up to $500 at the discretion of the judge). Through the North Carolina Department of Agriculture's Plant Protection Office, permits are issued for cultivation of plants and sale of cultivated material, but there is no tracking of the sale of *Hydrastis* as a crop.

3.4. Actual or Potential Trade Impacts

The international trade in goldenseal is not a new phenomenon, but has been ongoing for at least the last hundred years. In the late 1800s, 680 kg of goldenseal are known to have been exported to Europe (Catling and Small 1994) and 63,500-68,000 kg were collected annually to meet the domestic demand for goldenseal. Much of this supply came through Cincinnati in the Ohio Valley.

Even though isolated populations of goldenseal may be locally abundant, according to a reputable herb trader "everything could change in just one harvest season, regardless of how `ethical' each herb company and wildcrafter claims their harvesting practices are, due to the unethical wildcrafters that come right behind them, anxious for their share of the minimum $50/lb wholesale price for *Hydrastis* roots" (The Nature Conservancy 1995).

Although goldenseal may be exported from a particular state, tracking where it actually comes from is not done. For example, the Wisconsin Department of Natural Resources reports that most of what is exported through Milwaukee, Wisconsin, comes from other states. Yet it also reports that much of the wild Wisconsin goldenseal is sent to other states (rather than being exported). Therefore, documentation is not only scarce, but often complex and ambiguous.

Most goldenseal populations are classified or considered as facing some degree of threat of extinction, and continued heavy exploitation by the commercial herbal industry may result in further pressure on these populations, including risks of genetic alteration. The inclusion of the species in Appendix II would help to ensure that the trade in this species will be carefully monitored, and may also provide a further stimulus for the cultivation of this species, thereby alleviating unmanaged heavy collection from the wild populations.

3.5. Artificial Propagation

Exact reports of the artificial propagation of goldenseal outside the country of origin are unknown. There have been attempts in the past but they seem to have failed due to lack of proper conditions or loss of interest by propagators. *Hydrastis canadensis* was introduced into England as early as 1760 under the name *Warnera*. It was later grown at Kew Gardens near London, Edinburgh and Dublin. However, since it was lacking in size or attractiveness, and without ornamental value, cultivation in the United Kingdom occurred in the intervening years only on a small, experimental scale in botanical gardens (Grieve 1931). One German drug trader offers *Hydrastis* for cultivation, but attempts to cultivate it in Germany have been without success (Lange-Osten 1996).

Because there is little or no regulation of this species, information on the volume of propagated plants in trade is not known (*cf*. Schery 1972).

There is little detailed information available on production practices. No reports of replicated university or USDA field studies on goldenseal production practices are known. While cultivation of goldenseal (as a field crop and/or woods-grown) has been in existence since the 1900s in North America and it has been grown in, for example Arkansas, Tennessee, North Carolina, Massachusetts, Ontario, Michigan, Wisconsin and Iowa and well outside its native range in Oregon and Washington, much and seemingly most of the commercial demand for this species is met from wild sources (Catling and Small 1994, Foster 1991).

Goldenseal reaches maturity in 3-4 years when propagated from rhizome pieces or root cuttings, and in 5-6 years when grown from seed (Davis 1995, *cf*. Bowers 1891, Lloyd 1912, Haage and Ballard 1989). It is not known how artificial propagation over time affects the medicinal alkaloid content of the rootstock.

J. Christopher, an herbalist who has frequently prescribed this species, stated that at least a 4-year-old root is necessary to have the desired medicinal effect. Research by J. Davis in a recently completed 3-year study with container-grown individuals suggests that fertilization, while increasing the growth rate, also yielded lower alkaloid levels (Kauffman 1996).

The start-up price for rootstock can also be prohibitive. A major supplier for North American botanicals, in their recent 1997 catalog, offers rootlets for propagation at US$ 450-600 per lb (depending on size of "rootlet" — could go even higher) (Bannerman 1997). Therefore, pressure is increased to get the rootstock for cultivation from wild sources. According to the state of Wisconsin's Department of Natural Resources, most of the rootstock used in cultivation is currently purchased from dealers who get it from the wild in southern states (Kearns 1996, *in litt*.).

Propagation from the rhizome is generally the preferred method of cultivation on two counts: the seed is expensive, and propagation from the seed is difficult. Some years, 10-90% of stratified seed is not viable. Growers report that the seed rot or are empty inside. Viability loss may be due to a number of conditions including poor pollination, disease, or improper stratification conditions. More research needs to be focused on propagation from seed, both because the current supply of vegetative planting stock is limited to large-scale production of goldenseal and because of the potential loss of genetic robustness with the more widespread vegetative propagation (Davis 1995). Under optimum growing conditions, including climate, current yields of cultivated goldenseal may range from 1,000-2,000 lbs per acre [0.405 ha] (Davis 1995). However, there are many variables in determining quantity and quality of yields.

Goldenseal crops are apparently used as a rotational crop for American ginseng on farms in Ontario and the American Midwest. This practice is attractive because of the high price of goldenseal and because the same equipment is used to grow both species. In addition, goldenseal is resistant to the diseases that afflict ginseng (*e.g*., root rot and leaf blight), and can grow where ginseng was previously cultivated (Davis 1995). Finally, as ginseng is not grown directly twice on the same land under artificial shade owing to the concentration of soil pathogens that remain in the soil and prevent a second ginseng crop from surviving to second harvest, goldenseal is a viable alternative crop.

Increased cultivated sources of goldenseal should help to supply the commercial trade in the future. Inclusion of this species in Appendix II should stimulate the transition from the collection of mainly wild plants of increasingly threatened populations to the cultivated sources, alleviating some of the pressure on wild populations.

4. Conservation and Management

4.1. Legal Status

4.1.1. National: See Table 4. General semi-historic summaries of potentially germane U.S. state laws are in Countryman (1977), Hardin (1977) and Mohlenbrock (1977).

4.1.2. International: None.

4.2. Species Management

4.2.1. Population Monitoring

The task of population monitoring of this and other plant taxa is carried out in some U.S. states through the Network of Natural Heritage Programs and Conservation Data Centers which were established by state and national government agencies in conjunction with a private organization, The Nature Conservancy. However, a serious shortage of funds and scientific personnel has prevented any comprehensive monitoring, and most

analyses rely on anecdotal information of disparate field workers.

4.2.2. Habitat Conservation

This species occurs in variously designated and protected areas across its range (*e.g.*, national forests and parks). However, the species itself is scarcely or usually not monitored, regulated, or protected in any of these areas. The establishment of habitat conservation and biological research programs on public lands is a critical and unmet need for the species.

The Nature Conservancy (TNC) has several site-protection programs where this species is known to occur. Currently TNC protects a New York Great Gully site and plans to protect a Massachusetts site, a C & O Canal NHP site, a Maryland population and a privately protected population in Michigan.

4.2.3. Management Measures: See Table 4.

There are no comprehensive management programs in place to manage populations of the species or ensure a sustainable regeneration from utilization of the species.

Several goldenseal growers and collectors advocate a non-intrusive and temperate approach to the wild-harvesting of this plant, recommending that "the budding end of the rhizome be broken off and replanted as a conservation measure" (Elliott 1995). However, there is presently no scientifically valid guideline for "ethical and sustainable harvesting" in the wild since significant aspects of population and reproductive biology are unknown. Statements by herbal companies that such material has been "ethically wildcrafted" or the assurance that such is the case by having collectors or sellers sign a document to this effect is scientifically indefensible at this time (Bannerman 1997).

Table 4

Comments from U.S. States on the Protection, Management, Artificial Propagation, and Wild Collection of Goldenseal

Name of State	**Protection Status and Management Measures**	**Artificially Propagated vs. Wild Collected**
Alabama	"It is on TNC's rare plant list and is classified as being imperiled at the state level."	"Entirely wild collected. Subject to intense collection pressures."
Arkansas	"No legal status. No information available on the trends in the population but there has been some concern since it is wild crafted."	"No cultivation."
Connecticut	*"Hydrastis canadensis* is listed as State Endangered pursuant to the State Endangered Species Act (C.G.S. 26-303). We have only two extant populations and two other historic populations in the state."	
Delaware	"*H. canadensis* does occur in Delaware and populations are found within the Piedmont physiographic regions of the state ... considered uncommon in Delaware (uncommon due to limited habitat in the state, not from overcollection)."	
Georgia	"It is a protected species and is listed as State Endangered. Occurrences of this plant are restricted to 11 counties. This taxon is becoming increasingly rare as the hardwood forest in which it is found	"Not aware of any cultivation in the state."

Comments from U.S. States on the Protection, Management, Artificial Propagation, and Wild Collection of Goldenseal		
Name of State	**Protection Status and Management Measures**	**Artificially Propagated vs. Wild Collected**
	shrinks."	
Illinois	"Listed as State Threatened and protected from collection from the wild. However collection from private land is not regulated and is left to the discretion of the landowner. General observations indicate that harvest of goldenseal has increased in the past few years as its price has increased. [Goldenseal] is protected from taking on State Parks and Nature Preserves."	"Most of the goldenseal in the state comes from the wild. There may be some propagation from the seed."
Indiana	"*Hydrastis* is tracked as "watch list" in our Natural Heritage database." "... goldenseal appears to be experiencing a serious decline due to increasing harvest ..."	"Information not available."
Iowa	"Species is not monitored."	
Kentucky	"No legal protection status."	"Not believed to be cultivated in the state."
Louisiana (* Likely not native)	"No information available."	
Maryland	State Threatened	
Massachusetts	"Goldenseal is listed as "Endangered" in the regulations ... which offers considerable protection to these species from "taking", on both public and private lands. There are only 2-3 small populations consisting of a few individuals most of which do not flower or fruit. Goldenseal is listed as Endangered in Massachusetts because there are only three current stations (located or verified since 1978) and one historical station (unverified since 1978). Of the three stations however, only two are believed to be natural while the species was cultivated at one site. At another of the current stations no plants were found the last time a survey was carried out. All had been dug up by humans and wildlife. The plant's rarity in several states is mainly the result of collecting by humans. As with all plant species listed in Massachusetts, individuals are protected from taking (picking, collecting, killing ...) and sale under the Massachusetts Endangered Species Act."	"Goldenseal is cultivated in Massachusetts ... a couple of acres." "However there is probably no collection of goldenseal since populations in the state have been reduced to only a few individuals or small patches."
Michigan	"Legally protected as a State Threatened species. Grows only in Southern, lower Michigan and 59 occurrences have been tracked."	"Wild collected. No knowledge of any cultivation being carried out in the state."
Minnesota	"Listed as a State Endangered plant and prohibited from collection on both public and private land."	"The Natural Heritage and Game Program

Comments from U.S. States on the Protection, Management, Artificial Propagation, and Wild Collection of Goldenseal		
Name of State	**Protection Status and Management Measures**	**Artificially Propagated vs. Wild Collected**
	There are currently 12 documented and 4 undocumented populations known in Minnesota. According to the Minnesota Department of Natural Resources, "*Hydrastis* has always been rare in Minnesota because it occurs at the periphery of its range here. Recently, however, it has become rarer because of intensive gathering by herb collectors for folk medicine uses. It is also exploited commercially for the pharmacological value of its root. This has led to its decline not only in Minnesota but across its entire range. This makes *H. canadensis*, like ginseng, one of the few plants that faces a serious species-specific threat. In other words, the main threat to this species is not the unknowing destruction of its habitat but the selective exploitation of the plant itself."	is currently receiving at least one call a week asking if it's legal to collect the plant in Minnesota. As it is cultivated within the state only on a limited basis, it is suspected that some illegal collection is occurring for the commercial trade."
Mississippi	"Not protected. Mississippi falls within the extreme southern edge of the range and there are two populations of this species, one of which numbers less than twenty."	"No tradition of collecting this plant in the state but there is inadequate information to make a definitive statement. Also there is not likely to be any cultivation of the plant."
Missouri	"No specific protection, but digging is not allowed of any plants on most public lands. It is believed to be fairly common in the state." "There is much suitable goldenseal habitat remaining in the state, and healthy populations are not difficult to locate."	"No cultivation of goldenseal in the state. The roots are dug to supply the commercial trade."
Nebraska (* Likely not native)	"While a few specimens of this plant have reportedly been collected from Nebraska, it is unlikely that Nebraska falls within the range of the species and the few specimens that were found may have been artificially propagated at some time."	"Not cultivated or collected from the wild."
New Jersey	"Classified as historic."	
New York	"[*Hydrastis canadensis*] is listed as Threatened in NY state. It is protected from taking on private land without the permission of the landowner and from taking on state land. Fines of $25 are levied for each plant extracted from the wild without a permit." "... known from 17 extant sites and 3 historic sites in New York." "The total state population is estimated to be approximately 50,000 to 60,000 plants. ... About half of the known sites have some protection ..."	"Not cultivated. It is artificially propagated."

Comments from U.S. States on the Protection, Management, Artificial Propagation, and Wild Collection of Goldenseal		
Name of State	**Protection Status and Management Measures**	**Artificially Propagated vs. Wild Collected**
North Carolina	"An endangered species of special concern at state level. Collection from the wild is prohibited with the exception of permits issued for scientific purposes."	"Since collection is prohibited we are not aware of any wild-crafting activities. Although there are no statistics on the quantity of goldenseal that is grown, it is cultivated in the state and we have issued quite a few permits for its propagation." "We actively support the propagation of goldenseal ..."
Ohio	"Goldenseal is harvested extensively in Ohio by ginseng diggers but it's anyone's guess just how much is harvested and sold to pharmaceutical houses each year. The price for goldenseal has increased significantly in the last few years so it is reasonable to believe that it is subject to at least as much harvest pressure as ginseng. Based on personal observations of the commercial demand for goldenseal, a considerable decrease in the goldenseal population is anticipated in the future."	"Not cultivated. All sources of goldenseal come from the wild."
Oklahoma	"Oklahoma has no plant protection laws and this plant is not protected. However it is fairly rare."	"Cultivation is unlikely in the state. It is mostly collected from the wild."
Pennsylvania	Classified as a Vulnerable species. "... a consensus that *Hydrastis canadensis* is currently secure within the Commonwealth."	"Both collected and cultivated..." "The portion of trade involving wild root dug in Pennsylvania was under 1,000 pounds."
Tennessee	"Under the State Rare Plant Protection and Conservation Act, goldenseal is State Threatened."	"Tennessee has a number of nurseries devoted to the cultivation of medicinal plants and it is certainly possible that some goldenseal is grown in the state. Wild harvesting of the root has also been observed. Collectors tend to denude the area of all available plants and only a few roots are left in the soil to regenerate."

Comments from U.S. States on the Protection, Management, Artificial Propagation, and Wild Collection of Goldenseal		
Name of State	**Protection Status and Management Measures**	**Artificially Propagated vs. Wild Collected**
Vermont	"Protected as a State Endangered species. There are no more than two populations of the species, one consisting of several hundred stems and another smaller population."	"Not artificially propagated but it is not known if there is any kind of wild collection taking place in the state."
Virginia	"This plant has been taken off the rare species list and is now on the state watchlist."	"Probably both cultivated to some extent as well as collected from the wild."
Washington (* Not native)	"No available information on the plant."	"Not known."
West Virginia	"No legal status. Locally abundant in West Virginia ... It is exploited for medicinal purposes and is currently threatened by development of its habitat."	"Wild collected. Not artificially propagated."
Wisconsin	"Goldenseal is on our list of species of special concern, which means that we have some reason to believe that it ... is being harvested from the wild. We are aware that a few ginseng dealers do purchase goldenseal roots from harvesters. They apparently purchase goldenseal from other states as well as Wisconsin." "... it is apparently sufficiently abundant that it has been harvested for many years. It is known to occur on at least 10, and probably many more protected areas in the state."	"Artificially propagated. Cultivated quantities of goldenseal are believed to be insignificant." "Since [World War II], very little has been cultivated."

Sources: Responses from state natural resource agencies and Natural Heritage Programs to recent TRAFFIC USA "Survey on the Biological Status and Commercialization of Goldenseal (*Hydrastis canadensis*)" and to U.S. FWS 10/96 draft potential CITES proposal.

4.3. Control Measures

4.3.1. International Trade: None.

4.3.2. Domestic Measures: See Table 4.

5. Information on Similar Species

One other species of *Hydrastis* is reported to occur, in Northeast Asia (Whiteley 1989). Reports of this genus in Japan (*e.g*. Mabberly 1990, Airy Shaw 1973) may refer to the species generally known as *Glaucidium palmatum* Sieb. & Zucc. (syn. *G. paradoxum* Makino, *Hydrastis jezoensis* Sieb. *ex* Miquel) — *e.g*. see *Flora of Japan*, Ohwi 1965 (Foster 1991) (*cf*. Barnes 1989).

6. Other Comments

Canada, the only other range state, has informed the United States of its support for inclusion of *Hydrastis canadensis* in Appendix II.

Comments were sought via a notice (28 August 1996) in the U.S. *Federal Register* 61(168): 44324-44332,

with a closing date for the public of receipt at the U.S. Fish and Wildlife Service/OSA, Washington, D.C., by 11 October 1996. The draft potential proposal was also sent to appropriate agencies in the states where this species occurs. There were comments from agencies
and organizations in favor of and against submitting a proposal, and as usual with the U.S. process comments will be summarized in a forthcoming *Federal Register*.

7. Additional Remarks

7.1. Parts and Derivatives: The species is proposed without exclusion of parts or derivatives such as the finished pharmaceutical products in order to maintain the full legal option at this time (10 January 1997, the deadline for submission of CITES proposals) to regulate such end-product medicinals if necessary. Further evaluation of whether that would be necessary is ongoing.

7.2. Cover: The international trade in goldenseal may serve as a cover for the export of American ginseng (*Panax quinquefolius*), which is in CITES Appendix II. For example, some shipments of ginseng are believed to have been smuggled out from Missouri in the guise of goldenseal by mis-declaring them (Smith 1995).

7.3. Criteria: The species *Hydrastis canadensis* that is herein proposed for inclusion in Appendix II under the provisions of Article II.2(a), as shown above, qualifies under the criteria
in Annex 2a of Resolution Conf. 9.24.

7.4. Disclaimer: No directive medical recommendations are made herein.

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