CONVENTION SUR LE COMMERCE INTERNATIONAL
DES ESPECES DE FAUNE ET DE FLORE SAUVAGES MENACEES D'EXTINCTION

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Shepherdstown (Etats-Unis d'Amérique), 11 – 15 décembre 2000

Propositions relatives à des espèces, à soumettre à la CdP12

LIGUSTICUM PORTERI

Le présent document a été préparé par l'autorité scientifique des Etats-Unis d'Amérique.

Le Programme pour le développement durable et la biologie de la conservation de l'Université du Maryland a conclu que *Ligusticum porteri* remplit les critères d'inscription à l'Annexe II de la CITES en raison des mesures de protection régionales et d'Etat, des effets des prélèvements visant à satisfaire une demande croissante de plantes médicinales, et de l'échec de la mise en culture de cette plante. Le projet de proposition joint en annexe a été soumis à l'autorité scientifique des Etats-Unis d'Amérique en décembre 1999 et est en cours d'examen. Nous saurions gré aux autres Parties de nous faire parvenir leurs commentaires.

Le présent rapport servira de document de travail puisque la prochaine session de la CdP ne devrait avoir lieu qu'en 2002. Les botanistes et autres spécialistes de la conservation des plantes, de la phytothérapie et de la gestion des ressources naturelles ne s'entendent toujours pas sur l'état et les tendances des populations de *L. porteri*, ni sur la nécessité de prendre des mesures de conservation pour cette espèce. De telles mesures existent déjà dans plusieurs Etats et régions mais pas dans la toute l'aire de répartition de l'espèce. Il sera donc essentiel de renforcer la surveillance continue des populations pour déterminer le statut de l'espèce dans tous les Etats où elle est présente. Au plan commercial, *L. porteri*, appelée osha dans l'industrie des plantes médicinales, est de plus en plus demandée. Cette espèce, qui fait l'objet de nombreuses utilisations médicinales, est surtout utilisée pour traiter les refroidissements et les infections des voies respiratoires. Les tentatives de mise en culture ayant échoué, toutes les plantes prélevées à l'heure actuelle sont sauvages. En résumé, la demande en pleine expansion, l'absence de protocole de mise en culture et l'état incertain des populations dans l'aire de répartition naturelle de l'espèce sont autant d'éléments qui plaident en faveur de l'inscription à l'Annexe II de la CITES.

L'inscription de *Ligusticum porteri* à l'Annexe II pourrait néanmoins se révéler difficile en raison de certains problèmes pratiques. Ainsi, la demande d'osha est en augmentation mais l'industrie des plantes médicinales n'établit pas de distinction entre les différentes espèces de *Ligusticum*. Comme les cueilleurs et les producteurs de plantes médicinales ne différencient que rarement les espèces, et celles-ci étant difficiles à distinguer les unes des autres, même en utilisant des clés taxinomiques, l'inscription exclusive de *L. porteri* pourrait poser des problèmes. En outre, l'identification de *L. porteri* dans les régions des Etats-Unis d'Amérique qui ont réglementé les prélèvements de l'espèce dans la nature est sujette à controverse.

(English only / Solamente en inglés / Seulement en anglais)

DRAFT Proposal to List *Ligusticum porteri* in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora

Twelfth Meeting of the Conference of the Parties (?)

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

B. Proponent: Draft proposal submitted to the Scientific Authority of the United States for consideration - comments from Parties are appreciated

C. Supporting Statement

1. Taxonomy

1.1 Class	Magnoliopsida (dicotyledons)
1.2 Order	Apiales
1.3 Family	Apiaceae
1.4 Scientific Name	*L. porteri* var. *brevilobum* Coult. & Rose
	L. porteri var. *porteri* Coult. & Rose
1.5 Scientific Synonyms	*Ligusticum madrensis* (Mexico)

1.6 Common Names

The most frequently used common name for *Ligusticum porteri* (Apiaceae) is osha, especially in the context of its medicinal properties. Other common names include Porter's licoriceroot, Mountain lovage, Colorado cough root, Lovage, Porter's lovage, Porter's wild lovage, and Southern *Ligusticum* (Arnberger, 1968; Plants for a Future,1999). In trade, it is most often referred to as osha or *Ligusticum*, names that may also be used for other species in the genus that are collected and used for medicinal purposes. This plant was used by Native Americans in the United States who referred to it as bear medicine (Moerman,1998). In Mexico, *L. porteri* is referred to as chuchupaste, chuchupa, or chuchupate—names which also refer to the plant's pharmaceutical preparation.

2. Biological Parameters

Ligusticum porteri is a perennial herb in the carrot family (Apiaceae, previously Umbelliferae) that grows in moist fertile ground in upland meadows and ravines throughout its range (Plants for a Future, 1999). *L. porteri* grows 50 to 100 cm tall. The plant has elliptic or lance-shaped leaf segments that are 5 to 40 mm in width with tapered basal leaves that are 15 to 30 cm long. *L. porteri* is distinguished by its tap root, which has fibrous root hairs and a distinctive odor due to resins produced by the plant (Klein, pers. comm.) Inflorescences are white with five petals per flower arranged on flat-topped umbels. Flowers are small, approximately 2 to 5 mm in diameter, and produce oblong-shaped ribbed fruits that are 5 to 8 mm in length (Plants for a Future, 1999). Seeds have no mechanism for wind dispersal and probably drop close to the parent plant (Inouye, pers. comm.). *L. porteri* inhabits late to climax successional high elevation meadow communities, characterized by tall forbs and deep soils.

2.1 Distribution

Ligusticum porteri is native to many non-coastal western states in the United States. Populations of *L. porteri* are found throughout much of the Rocky Mountains from northern Wyoming to Chihuahua, Mexico (see Appendix I). The species is found throughout much of Colorado and Utah, in parts of Arizona, Idaho, New Mexico, Nevada, and Wyoming, and may be present in Montana. While no state agency has precise or comprehensive figures on the number or density of *L. porteri* populations within their borders, a number of experts have estimates of the distribution and range of the species.

Populations grow along streams, on open slopes, and in aspen and mixed conifer/deciduous forests (Cronquist *et al.*, 1997). More specifically, *L. porteri* can be found in association with aspen (*Populus* sp.), oak (*Quercus* spp.), sagebrush (*Artemesia* spp.), Douglas fir (*Pseudotsuga menziesii*), spruce (*Picea* sp.), fir (*Abies* sp.), and sometimes in open forb-grass communities at elevation ranges between 2050 to 3171 meters (Welsh, 1993). *L. porteri* grows in aspen (*Populus* sp.) forests, where it is increasingly collected for medicinal uses.

Most Colorado populations of *L. porteri* are found in Lodgepole pine (*Pinus contorta*), Engelmann spruce (*Picea engelmannii*) forests or mountain big sagebrush/buckbrush (*Artemesia* spp.) meadows on rocky soils. At higher elevations, *L. porteri* may be present in open areas in mixed-conifer, aspen, and pine forest communities. The species may also grow along canyon bottoms at lower elevations (Godec, pers. comm.).

L. porteri grows throughout Utah, Colorado, and New Mexico. In Utah, the species has been idenfied in several counties including Beaver, Cache, Carbon, Duchesne, Emery, Garlfield, Grand, Iron, Juab, Kane, Millard, Piute, Sand Juan, Sanpete, Sevier, Summit, Tooele, Uintah, Utah, Wasatch, Washington, and Wayne (Welsh, 1993). Utah populations are primarily associated with coniferous or aspen woods and in open-forb communities at high elevations. In Colorado, *L. porteri* is found throughout the montane zone. It grows mainly in Colorado's aspen (*Populus* sp.) forest habitat, but is also associated with subalpine meadows and spruce-fir forests and throughout wet zones (Lyon, pers. comm.). There is also a report of a *L. porteri* population in the northern foothills of the Uinta Range in Sweetwater County (Fertig, pers. comm.). In New Mexico, *L. porteri* grows throughout mountainous regions of the state in aspen (*Populus* sp.) forests (Chauvin, pers. comm.).

Populations of *L. porteri* are less abundant in Wyoming, Arizona, Idaho, and Nevada. In southern Wyoming, the species is found in Albany and Carbon counties in the Sierrra Madre and Medicine Bow Mountains (Cronquist *et al.*, 1997). Older reports from northwest Wyoming are based on specimens now attributed to *Ligusticum canbyi*, a close relative (Fertig, pers. comm.). In Arizona, *L. porteri* populations vary from infrequent to common, depending on the locale. *L. porteri* is found on mountains and plateaus of Apache, Coconino, Graham, Cochise, and possibly Pima and Yavapai Counties reaching 6,500 to 11,500 feet in elevation. In Idaho, *L. porteri* has been identified in Twin Falls County, which is in the southeastern region (Cronquist *et al.*, 1997). *L. porteri* has also been collected from the Snake Range and Jarbidge Mountains in northeast Nevada (Charlet, 1995).

The presence of *L. porteri* in Montana is uncertain. *L. porteri* was identified in Carbon County (Dorn, 1984), but this may have been based on misidentified herbarium specimens (Heidl, pers. comm.). The Montana Natural Heritage Division has initiated a study to verify the identification and to evaluate the extent of *L. porteri* in Montana.

2.2 Habitat Availability

Suitable habitat for *L. porteri* is fairly abundant in Arizona and Utah (Welsh 1993). Habitat for *L. porteri* is also currently widely available in Colorado although logging, grazing, and recreational vehicle traffic threaten to reduce what is available (see section 2.7, Threats). The Forest Service has identified tall forb communities as highest priority habitat for Region Four (Prendusi, pers. comm.).

Suitable habitat for *L. porteri* is more limited in other states. Habitat in Nevada is limited to the extreme eastern area of the state in the Snake Range and Jarbidge Mountains. Approximately 90 percent of the area is federally owned, and a portion is permanently protected as Jarbidge Wilderness. Other portions of federal land in Arizona are managed for grazing. Such activity may be harmful to tall forb communities (Prendusi, pers. comm.). There is no specific information on habitat availability in the remaining states in *L. porteri*'s range.

2.3 Population Status

Ligusticum porteri is listed as "rare" on the 1997 IUCN Red List of Threatened Plants (Walter and Gillett, 1998). This designation indicates that the species has a small world population that is not yet endangered or vulnerable, but is at risk of becoming so. Rare species usually have a restricted range or habitat type, or are thinly scattered over a more extensive range (Walter and Gillett, 1998).

While most state agencies do not currently monitor this species, conservation organizations and herbal medicine specialists are concerned about the status of wild populations of *L. porteri* as well as several other species in the genus *Ligusticum*. United Plant Savers (UpS) is a conservation organization that focuses its efforts on populations of medicinal plants collected from the wild. UpS publishes a list of "at risk" species that details those species that deserve conservation attention due to human impact (UpS Education, 1999). TRAFFIC North America, part of World Wildlife Fund, recently classified *L. porteri* populations as declining over the past ten years (Robbins, 1999).

While natural resource agencies have not focused vegetation surveys on *Ligusticum porteri*, regional and state botanists questioned for this investigation (see Appendix II) provided some general conclusions about the current status of populations within the species' range. The opinions of botanists varied from state to state, and some have recommended increased monitoring of populations. In most cases, implied or current threatened status for *L. porteri* is due to grazing, commercial and residential development, ATV recreational activities, logging and collection for medicinal use (see section 2.7, Threats).

For example, populations of *L. porteri* in Arizona, Colorado and Utah are currently stable. This designation indicates that populations are uncommon but not rare, and usually widespread throughout the state (Natural Heritage Database, 1996). Also, Colorado populations appear large and stable according to Natural Heritage staff in Colorado (Lyons, pers. comm.).

L. porteri is not considered rare in Utah and populations have been identified in every county (Atwood, pers. comm.). According to other state natural resources staff in Utah, the species has been considered relatively common (Franklin, pers. comm.; Sivinski, pers. comm.). The species is not listed on the Endangered Species Act or on the Sensitive Species Program of Utah (Atwood, pers. comm.). One source, however, indicates that although this plant seems to be widespread, it may be locally rare throughout its range in Utah (Atwood, pers. comm.). The Utah Natural Heritage Program's *Endemic and Rare Plants of Utah* includes *L. porteri* in the *Taxonomic Problems* category, since it is difficult to distinguish from other *Ligusticum* species.

The debate over the status of *L. porteri* in Utah seems to stem from a book published by Stanley Welsh in 1975. His *Endangered, Threatened, Extinct, Endemic, and Rare or Restricted Utah Vascular Plants* lists *L. porteri* as endemic, rare, local and possibly threatened (Welsh, 1975). When *L. porteri* was listed in a 1978 Smithsonian and World Wildlife Fund article entitled *Endangered and Threatened Plants of the US* (Ayensu, 1978), Welsh's article was the only reference. In 1986, IUCN published *Plants in Danger*, which led to the listing of *L. porteri* on the IUCN Red List of Threatened Plants. Welsh's 1975 article is the citation for the species' listing. However, in Welsh's 1985 follow-up article, *Utah's Rare Plants Revisited*, *L. porteri* was completely omitted from the article with no further explanation.

Populations in New Mexico, Wyoming, Nevada, Idaho, and possibly Montana may be in decline, or at least relatively small and locally restricted. In the spring of 1999, the Montana legislature passed a moratorium on collection of any *Ligusticum* species on state-owned lands (Shelly, pers. comm.). As a result of Montana's moratorium on collection permits of *L. porteri*, Region 1 of the United States Forest Service (Montana, Northern South Dakota, North Dakota, and Northern Idaho) subsequently issued a Regional policy that recommends no issuance of collecting permits on USFS lands (Shelly, pers. comm.). Since part of Idaho is in USFS Region 1 and the rest of the state is in Region 4, the moratorium on collection of *L. porteri* for Region 1 was also adopted by Region 4 (Southern Idaho, Western Wyoming, Nevada, and Utah) (Prendusi, pers. comm.). This was primarily initiated to prevent the collection of *Echinacea purperea*, but all species listed on the Region 1 moratorium, including *L. porteri*, may not be collected. As mentioned previously, verification of the original identification of *L. porteri* in Montana—the identification that led to the moratoriums on collection—is currently

in dispute. Verification should be available at the conclusion of a study currently being conducted by the Montana Natural Heritage Division.

Despite the moratorium in Forest Service Region 4, there is evidence that *L. porteri* may not be threatened in Wyoming. The species does not appear in Fertig's *Wyoming Rare Plant Field Guide* (Fertig, 1995), the most recent authoritative publication on the state's rare plants. In Wyoming, *L. porteri* is currently known from approximately 25 extant populations and 10 historical sites and is ranked S3 (Vulnerable) by the Wyoming Natural Diversity Database in 1999. This designation indicates that populations are either rare and uncommon, found in a restricted range, or have other factors that make it vulnerable to extirpation (Natural Heritage, 1996).

L. porteri is not listed by the Northern Nevada Native Plant Society nor the Nevada Natural Heritage Program as either rare or sensitive. With regard to potential decline in *L. porteri* populations, the New Mexico Rare Plant Technical Council Meeting on March 28, 1998 identified *L. porteri* as a plant that may not be at present biologically rare but possibly in need of management due to collection pressures. They indirectly refer to United Plant Savers as a reference. They are currently in the process of putting together rare plant technical reports for management of the species identified (NMRPTCM, 1999).

Table 1: Species Status by State

STATE	STATUS*	PROTECTION
Arizona	Stable	None
Colorado	Stable	None
Idaho	Locally common	Forest Service moratorium
Montana	Identification in review	State moratorium Forest Service moratorium
Nevada	Stable	Forest Service moratorium
New Mexico	Potential decline	None
Utah	Common	Forest Service moratorium
Wyoming	Vulnerable	Forest Service moratorium

*Notations are based on interviews with U.S. Forest Service employees, state Department of Natural Resources employees and/or herbalists in each state, not on actual population estimates.

2.4 Population Trends

Populations of *Ligusticum porteri* appear to be relatively stable throughout much of its range but are pressured by development, grazing, and collecting. No precise trends are apparent at this time. Experts in the state of Colorado see no evidence of *L. porteri* decline, although threats from over-collecting may develop in the future (Lyon, pers. comm.). Populations in Wyoming are also thought to be stable at present. Population trends for *L. porteri* remain unknown in Arizona (Godec, pers. comm.). In Utah, there have been no studies on population status or trends (Atwood, pers. comm.). Teresa Prendusi, the botanist for USFS Region 4, asserts that much of the Mexican population of *L. porteri* may have been depleted, thus increasing harvest pressures in the United States. Refer to section 2.3 Population Status for more information on population trends of *Ligusticum porteri*.

2.5 Geographic Trends

Additional research should be done to determine patterns in species migration and changes in tall forb community distribution in the southern Rocky Mountains. If these data have not been published, then a historical range study should be conducted.

2.6 Role of the Species in its Ecosystem

Due to a lack of research on *L. porteri*, there is very little understanding of the role this species plays in ecosystems in its range. Nevertheless, this species does appear to play a role in maintaining the process of succession in the tall forb community. Because of its height, *L. porteri* likely outcompetes sagebrush (*Artemesia* spp.) and prevent sagebrush invasions in that habitat. The plant also probably provides cover for small animals, and maintains soil moisture. Flowers are attractive to a variety of insect pollinators, particularly flies (Inouye, pers. comm.).

2.7 Threats

Overall threats to *L. porteri* populations include the impacts of grazing, habitat loss, logging, and the collection of the plant for medicinal purposes.

Grazing may threaten many natural communities that support *L. porteri*. Tall forb communities have been identified by Forest Service Region 4 (southern Idaho, western Wyoming, Nevada, and Utah) as their highest habitat conservation priority, because this community is threatened with destruction from sheep grazing (Prendusi, pers. comm.). Additionally, grazing threatens easily accessible and small populations of plants. Management of suitable habitat in Arizona currently allows for some grazing. However, since there is sufficient habitat available, this species is not considered threatened in this area (Schwartz, pers. comm.).

Residential and commercial development may also result in the loss of local populations and prime habitat for *L. porteri* (Cech, pers. comm.; Prendusi, pers. comm.). Habitat loss due to development is a major threat, especially in Wyoming and Colorado. However, since a large percentage of available habitat in Colorado is in the National Forests, the rate of development in large portions of *L. porteri* habitat is slower than in privately-owned lands (Lyon, pers. comm.).

Another primary threat to *L. porteri* populations, and the impetus for listing this species in CITES Appendix II, is the demand for this plant for medicinal purposes. There is concern on the part of numerous regional experts that *L. porteri* is being overharvested in its native habitat (Blakely, 1998; Felger *et al.*, 1999). Harvesting is of concern primarily because the entire plant is harvested when collected. Herbalists that regularly prescribe *L. porteri* estimate that roots are over ten years old when harvested. This indicates a long-term loss of wild rootstock in areas where collection occurs (Blakely, 1998; Klein, in prep. 1999).

Currently, there is no propagation of the species for commercial trade because cultivation is challenging and not cost efficient (Herb Seed Index, 1999). Therefore, the combination of increased demand and the fact that *L. porteri* is not being cultivated, but gathered in total from slow-growing native populations, exacerbates threats to the species. Over time, it is projected that trade impacts will result in unsustainable harvesting and threaten existing genetic resources. Additionally, since populations are relatively small, local populations of this species can be wiped out in a matter of days by one or more collectors in a given area (Cech, pers. comm.). Finally, in federally-owned and state-owned forests, requests for permits for medicinal plant collections are rapidly increasing (Robbins, 1999).

In 1999, the Nevada Natural Heritage Program decided that the rise in plant collection for medicinal purposes must be addressed due to potential impact on native populations. Additionally, although the state of New Mexico does not regulate collection of *L. porteri*, the demand for this plant is increasing, especially in the aspen (*Populus* sp.) forests of New Mexico. If the situation does not improve, the species may disappear from sites that are easily accessible by collectors.

In the more accessible habitats in Utah, pressure is increasing from collectors, who are harvesting the plants for medicinal purposes (Sivinski, pers. comm.; UpS, 1999). Harvesting for medicinal use is strong in Utah's

aspen (*Populus* sp.) forests; however, such pressures do not affect all of the species' habitats. At this time, collection occurs primarily in the areas that are most accessible (Sivinski, pers. comm.). Populations in Arizona are also affected by collection, but the impact of such activities have not been documented to date.

Logging is reported to take place in some areas of suitable habitat in Arizona (Godec, pers. comm.). Current management of suitable habitat in Arizona also allows for some logging (Schwartz, pers. comm.). In addition to habitat loss, logging, overharvesting and grazing, experts in Wyoming raise one other potential threat to *L. porteri*: recreation, particularly all-terrain-vehicle traffic (Fertig, pers. comm.).

3. Utilization and Trade

3.1 National Utilization

Native Americans have used *L. porteri* for centuries as a deterrent and remedy for many ailments, particularly respiratory infections (Appelt, 1985). *L. porteri* has since entered the medical repertoire of Hispanic peoples in the United States and Mexico. Chuchupate, the Spanish common name also refers to a complex of *L. porteri* and *Myroxylon balsamum*, is a major component of many folk medicine kits in the Southwest United States and northern Mexico (Linares *et al.*, 1987).

L. porteri is recommended as a remedy for head colds, irritative coughs, initial stages of acute pharyngitis, acute early stage tonsillitis, bronchorrhea, acute coughs, acute influenza with coughing and dyspnea, acute bronchial pneumonia with dyspnea, fever with dry, hot interrupted diaphoresis, and leukocytosis (Moore, 1997). *L. porteri* is very effective as a tincture of fresh root 1:2, or dry root 1:5, in 70% alcohol. Twenty to sixty drops can be taken sublingually, up to five times per day. As a cold infusion, two to six ounces are mixed with water and taken as needed (Moore, 1995).

Isolated compounds from *L. porteri* yield various medicinal properties. For example, several furanocoumarins have been isolated from other *Ligusticum* species (Moore, 1977). These compounds may have properties which, when applied to the skin, prevent viral infections and inhibit tumor growth (Soine, 1964). Phthalides, such as butylidenephthalide (BdPh) and ligustilide, have also been isolated from *Ligusticum* species (Gijbels *et al.*, 1981). Experiments with BdPh have demonstrated that it can inhibit promoters of smooth muscle activity (Ko, 1980).

Few contraindications have been established for *L. porteri*'s medicinal usage. *L. porteri* may be present in the breast milk of lactating mothers (Moore, 1995). No assessment of the effects of *L. porteri* on newborns or nursing infants has been made.

The market for botanical medicines in the United States has risen from $1.6 billion to $4 billion in annual retail sales between 1994 and 1998 (Breevort, 1998). Based on discussions with experts throughout public land management agencies in western states, wild populations of *L. porteri* have been in decline over the past ten years and demand has increased over the same period of time. Trade has been characterized as medium to large (Robbins, 1999). Researchers from the United Plant Savers and TRAFFIC International show that demand for *L. porteri* is increasing (Robbins, 1999). At this time, *L. porteri* is sold in the form of ground roots, whole roots, tinctures, and seeds.

According to Michael McGuffin, President of the American Herbal Products Association, there is a small demand for *L. porteri* nationwide, but the species is in highest demand in the southwestern United States. According to industry representatives, *L. porteri* is gaining in popularity (Cech, pers. comm.). There is some evidence that the demand for and export of this plant to Mexico is also rising because the local plant populations in Mexico are in decline (Cech, pers. comm.).

Requests for catalogues from approximately 70 herbal companies that are members of the American Herbal Product Association (AHPA) resulted in responses from 36. Thirteen out of 36 catalogues consulted included *L. porteri* in their product lists. Therefore, one-third of the companies investigated sold *L. porteri.* A majority of companies in this survey did not carry *L. porteri*, however three of those companies confirmed that a prototype was being prepared. A leading U.S. herbal company reported that their annual usage of whole *L. porteri* root is 500 dry pounds, but it is not listed on their top selling list of the top 28 and top 100 bestsellers.

Echinacea (*Echinacea purpurea*) and Ginseng *(Panax ginseng*) are two top selling herbs that demonstrate similar properties to *L. porteri*. Echinacea, for which sales grew at a rate of 151 percent in 1998 (Breevort, 1998), is one of the most heavily demanded herbs in the market. Echinacea is similar to *L. porteri* in that it is taken to prevent colds and flu and is a general immune system enhancement product. With the cold/flu/immune system category of herbal products growing at a rate of 9 percent in 1998 (Breevort, 1998), the demand for *L. porteri* as an Echinacea analog has the potential to rapidly increase. Ginseng was listed in CITES Appendix II due to the demise of native populations in the United States; *L. porteri* is similar in that the entire root is harvested and cultivation is difficult. *L. porteri* populations face similar threats of extirpation.

3.2 Legal International Trade

Currently, there is only anecdotal evidence for export of *L. porteri* from the United States into Mexico (Cech, pers. comm.; Felger *et al*. 1999). Native populations of *L. porteri* in Mexico are being diminished due to over-collection and increased demand (Felger *et al*., 1999). Due to declining populations in some regions of Mexico that are partly the result of exporting roots to Japan, United States, and Germany (Felger *et al*., 1999), the potential for increased demand to impact United States native populations is high.

The Tarahumara, a native people in the Apachian-Mandrean region of Mexico, have formed a local business to harvest and process *L. porteri*.

Although there is anecdotal evidence of *L. porteri* from the United States being traded to Germany, senior staff in Germany's Office of Scientific Authority state that they have never heard of the *L. porteri* species and that they do not monitor importation of it (Schippman, pers. comm.).

3.3 Illegal Trade

Information regarding illegal trade is not currently available.

3.4 Actual or Potential Trade Impacts

As a result of the long recovery time of *L. porteri* and increases in demand, practitioners are urging the use of *L. porteri* analogs (Mckeon, 1999) until commercial cultivation programs become established. In the event that this species is listed in CITES Appendix II, both the use of analogs and cultivation will likely result. As mentioned previously, many populations of this species are locally restricted and rare, so if regulations are passed that limit harvesting, alternative plant material will have to come from cultivated sources or analogs. If regulations are not implemented, then the impending increase in demand will result in population decline. This is especially true since collectors remove the entire root of the plant when harvesting and this kills the plant and eliminates the potential for offspring.

In some cases, Natural Heritage biologists and herbalists are hesitant to share geographic and biological information about *L. porteri* when doing so will lead to further collection of plants in the wild (Heidel, pers. comm.; Jones, pers. comm.). Increased publicity that might occur if the proposed species is listed in CITES Appendix II could cause collection to increase. This suggests that listing the species may increase threats on populations due to collecting, but at this time, the benefits of listing the species (described above) probably outweigh the costs.

3.5 Artificial Propagation

To date, there is no artificial propagation of *L. porteri* in the United States; currently all roots are collected from the wild. Although cultivation is not possible at this time, seeds of *L. porteri* are available through some wholesale herbal seed companies. Experimentation in *L. porteri* cultivation has been ongoing for several years. There are individuals currently working out propagation protocols. However, they have not been successful to date, and no the information on propagation is currently available (Flaster, pers. comm.). Therefore, all levels of harvesting *L. porteri* will impact populations in native communities. This is exacerbated by the fact that collectors usually remove the entire root of the plant.

4. Conservation and Management

4.1 Legal Status

4.1.1 National

Except for Montana, none of the western states with *L. porteri* populations prohibit collection of the plants on state lands. While a regional moratorium is in place for *L. porteri*, enforcement of the regulations are not very strong. In Wyoming, for example, enforcement is negligible. Likewise, in Colorado the Forest Service and Bureau of Lands and Mines require permits for collecting, but again, restrictions are not enforced. Utah currently has no conservation measures for *L. porteri*, other than support for the regional moratorium.

Due to high demand in the southwestern United States and large amounts of *L. porteri* being collected, a federal moratorium on collecting *L. porteri* was passed by the United States Forest Service Regions 1 and 4. However, specific legal mandates have not been described.

4.1.2 International

Refer to Section 6, *Other comments.*

4.2 Species Management

4.2.1 Population Monitoring

State natural resource agencies are not currently monitoring populations of *L. porteri*. However, due to increased harvesting for medicinal use, there may be impetus for monitoring in the future. The Nature Conservancy, an international conservation organization, recently hired a botanist to investigate the conservation status of *Ligusticum porteri*, including impacts from medicinal plant trade. The results of this study should be available in January 2000 (Martinez, pers. comm.).

4.2.2 Habitat Conservation

Nature preserves, national parks, and national forests offer plant and animal species protection from collection, habitat loss, and other disturbances. Some *L. porteri* populations do occur within protected areas, such as Ramsey Canyon Preserve (owned by The Nature Conservancy) and Grand Canyon National Park in Arizona, and Medicine Bow National Forest in Wyoming.

Other populations occur in areas of limited use such as wilderness areas within National Forests (Godec, pers. comm.). In Nevada*, L. porteri* is found on federally owned land and the Forest Service has excluded grazing and timber extraction from Jarbidge Wilderness. Likewise, habitat in Colorado is protected in wilderness areas and in Wilderness Study Areas and Research Natural Areas. There are also numerous conservation easements on private lands that probably contain *L. porteri*.

4.2.3 Management Measures

There are no comprehensive management programs in place to manage populations of *L. porteri* or to ensure a sustainable harvest of populations for medicinal use. *L. porteri* is not formally protected under western states' native plant or endangered species laws. Collection of any plant does require permission from the landowner (federal, state, private, etc.) in most states. However, it is unlikely that suitable habitat is patrolled, frequently enough to deter unpermitted collection (Godec, pers. comm.).

4.3 Control Measures

4.3.1 International Trade

If the proposed species is listed in CITES Appendix II, then the regulations imposed by CITES will be the only legal regulation of international trade for this species.

4.3.2 Domestic Measures

While no state agencies currently conduct educational programs concerning the conservation of *Ligusticum porteri*, several individuals and non-governmental organizations have initiated conservation programs for the species. United Plant Savers, a non-profit education organization dedicated to preserving native medicinal plants, has created a suite of programs to address conservation of medicinal plants. By involving a number of respected herbalists and biologists, UpS has developed an "At Risk" list of medicinal plants that are in need of conservation attention. Their efforts are focused on increasing awareness of these plants and techniques for "ethical wildcrafting." Wildcrafting is the process by which herbalists and other plant collectors harvest plants from the wild. For many species, certain harvesting techniques will kill or severely damage the plant. Other techniques will help the plant to regenerate the parts that were harvested. UpS has published several recent articles on wildcrafting *L. porteri*, and has stimulated several letters to the editor about the plant in their newsletter (UpS Newsletter, 1999). Other outreach initiatives that UpS is undertaking include regional and national educational symposia and workshops. Botanists and other experts regard UpS highly, and their efforts seem to be increasing knowledge of medicinal plant conservation (UpS Education, 1999).

Other non-profit organizations are also concerned with increasing public knowledge and concern for wildcrafted herbs, but most (such as Plants for a Future) have not focused on *L. porteri*.

Many herbalists conduct their own educational efforts. Feather Jones, of the Rocky Mountain Herbal Institute, lectures locally and regionally about useful medicinal plants and ethical wildcrafting. Jones does not yet lecture about *L. porteri*, because she does not want to popularize it before cultivation techniques improve (Jones, pers. comm.).

5. Information on Similar Species

Several *Ligusticum* species, in addition to *L. porteri*, are collected for medicinal purposes and are collectively known as *L. porteri* by herbalists. In regions such as the Rocky Mountains, herbalists use any of the *Ligusticum* species and most do not distinguish between species when harvesting from the wild. Furthermore, depending upon the requirements set by companies that buy *L. porteri* from wildcrafters, the species of *L. porteri* that is collected and sold may not be documented (Klein, pers. comm.). This may make it difficult to regulate osha on an individual species basis, especially because it is relatively difficult to distinguish between the different *Ligusticum* species.

According to reputable botanists and herbalists, *L. porteri* is distinguished by its tap root, which has fibrous root hairs and a distinctive odor due to resins produced by the plant (Klein, pers. comm.). Many of the genera in the Parsley family (Apiaceae) have medicinal properties, including *Ligusticum*, *Lomatium*, *Osmorhiza*, *Angelica*, and *Heracleum*.

Both the genera *Lomatium* and *Ligusticum* are often referred to as lovage and species in both genera may be used interchangeably as they contain similar medicinal properties. The leaves of *Lomatium dissectum* are similar to those of *Ligusticum s*pecies; however, the flowers are chocolate-brown, whereas *L. porteri* flowers are white (Klein, pers. comm.). *Lomatium dissectum* root is also fragrant, but the odor is distinguishable from *L. porteri*. Its range overlaps with *L. porteri*; however, it grows between 1,280 and 3,170 feet elevation and *L. porteri* grows between 2,250 and 3,170 feet (see Appendix III).

Within the genus *Ligusticum*, *L. filicinum, L. canbyi*, and *L. tenuifolium* are similar species to *L. porteri* that may be used interchangeably as osha in the herbal market. Species may be identified according to the structure and number of "rays" in the compound umbel of the flower (Cronquist *et al.*, 1997; Dorn, 1984).

L. filicinum grows throughout Idaho, Montana, Oregon Utah, Wyoming, and Colorado between elevations of 1,910 and 3,400 feet (see Appendix IV). *L. tenuifolium* grows between 2,420 and 3,420 feet in the same range as *L. filicinum* (see Appendix IV). *L. porteri* can be distinguished from *L. filicinum* and *L. tenuifolium* because *L. porteri* has broader leaflets, but mature fruit is needed for positive identification in most cases (Plants for the Future Database, 1999). Also, *L. tenuifolium* individuals are 11 to 64 cm tall, have a mildly aromatic tap root, and a solitary or terminal umbel (Cronquist *et al*., 1997). *L. filicinum* is glabrous and has a

stout, caudex-like root. Stems are only single, although there is sometimes more than one cluster of basal leaves.

Species range of *Ligusticum canbyi* (Canby's wild lovage) spans British Columbia, Idaho, Montana, Nevada, Oregon, Washington, and Wyoming. It has been suggested that *L. canbyi* and *L. porteri* should be considered as varieties of a single species. However, their geographic ranges are different and their fruits are distinct (Cronquist *et al.*, 1997).

6. Other Comments

In November 1999, both the Mexican and German Scientific Authorities were contacted to solicit their comments regarding international trade in and demand for *L. porteri.* Comments have not been sufficiently obtained at this time, but follow-up is recommended.

There is anecdotal evidence that the United States exports osha to Germany. However, senior staff in Germany's Office of Scientific Authority state that they have never heard of *L. porteri* species and that importation of the species is not monitored (Schippman, pers. comm.). Future communications with the German Office of Scientific Authority is recommended.

Additionally, the herbal industry in Mexico uses osha in a product called Copangel and some plant material may be exported over the United States/Mexico border. The Mexican Office of Scientific Authority was contacted repeatedly to obtain information regarding international trade and demand. This dialogue should be continued in the future, as it is not clear whether the species does not occur or is not monitored in Mexico, or if there has been a miscommunication during the interviews conducted in November 1999.

7. Additional Remarks

L. porteri is proposed without exclusion of parts or derivatives such as the finished pharmaceutical products, to allow regulation of end-product medicinals if necessary.

No directive medical recommendations are made herein.

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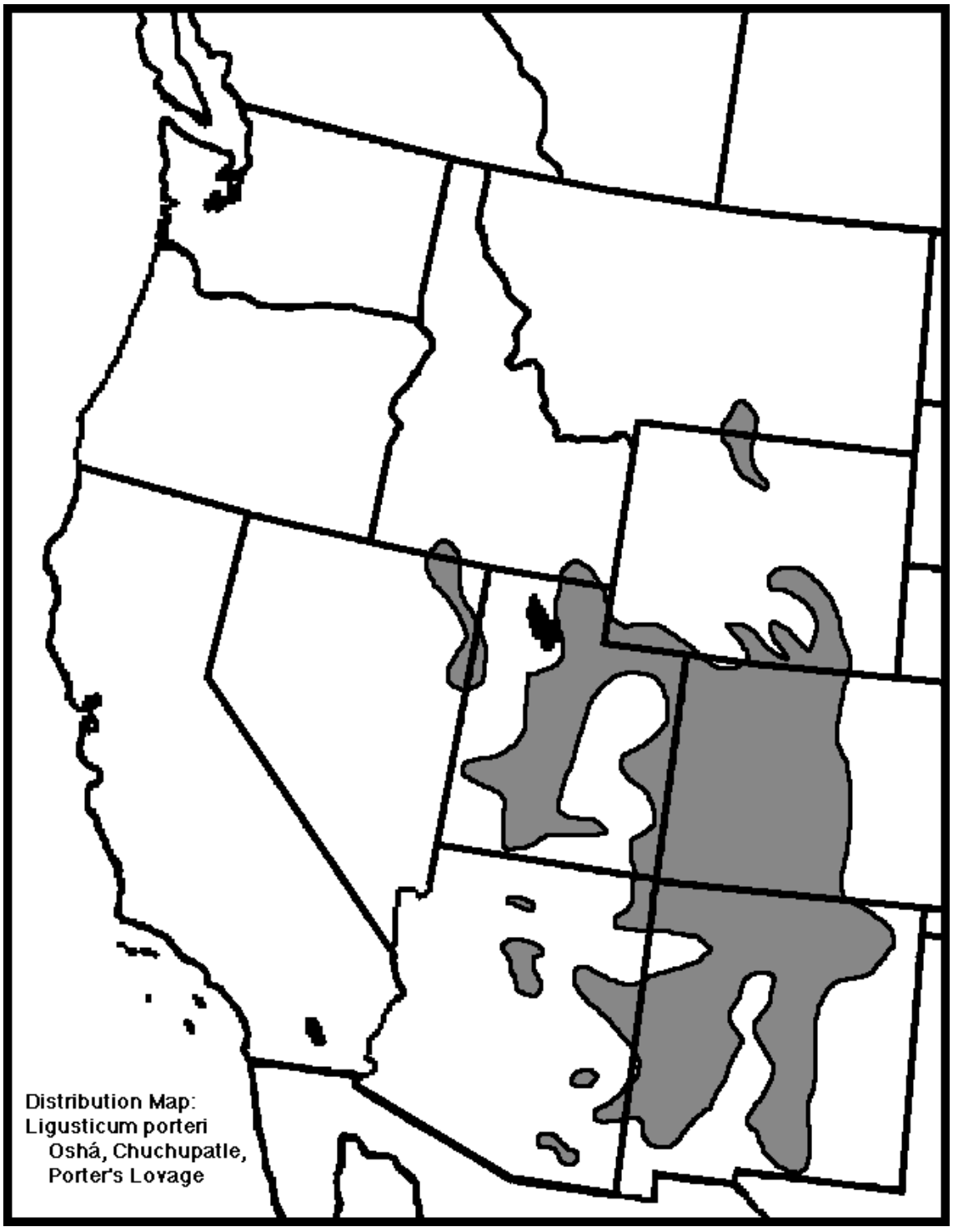
9.1 Appendix I: Distribution Map of *Ligusticum porteri*



Map credit: Michael Moore's Southwest School of Botanical Medicine

9.2 Appendix II: Survey Questions for Regional and State Botanists

1. What is the distribution of the species in your state? What habitat types do you associate it with?

2. How available is habitat for *L. porteri*? Are there any pressures on suitable habitat?

3. How would you characterize the status of the populations in your state?

4. What has been happening to the populations over the past 10 years? Longer? Are there any threats that it is facing?

5. Are there any geographic trends with *Ligusticum*? Any differences between populations?

6. What is the role of *L. porteri* in the ecosystem?

7. What threats are facing *L. porteri* in the wild?

8. What impacts on the population are occurring because of trade/collection? What impacts could occur?

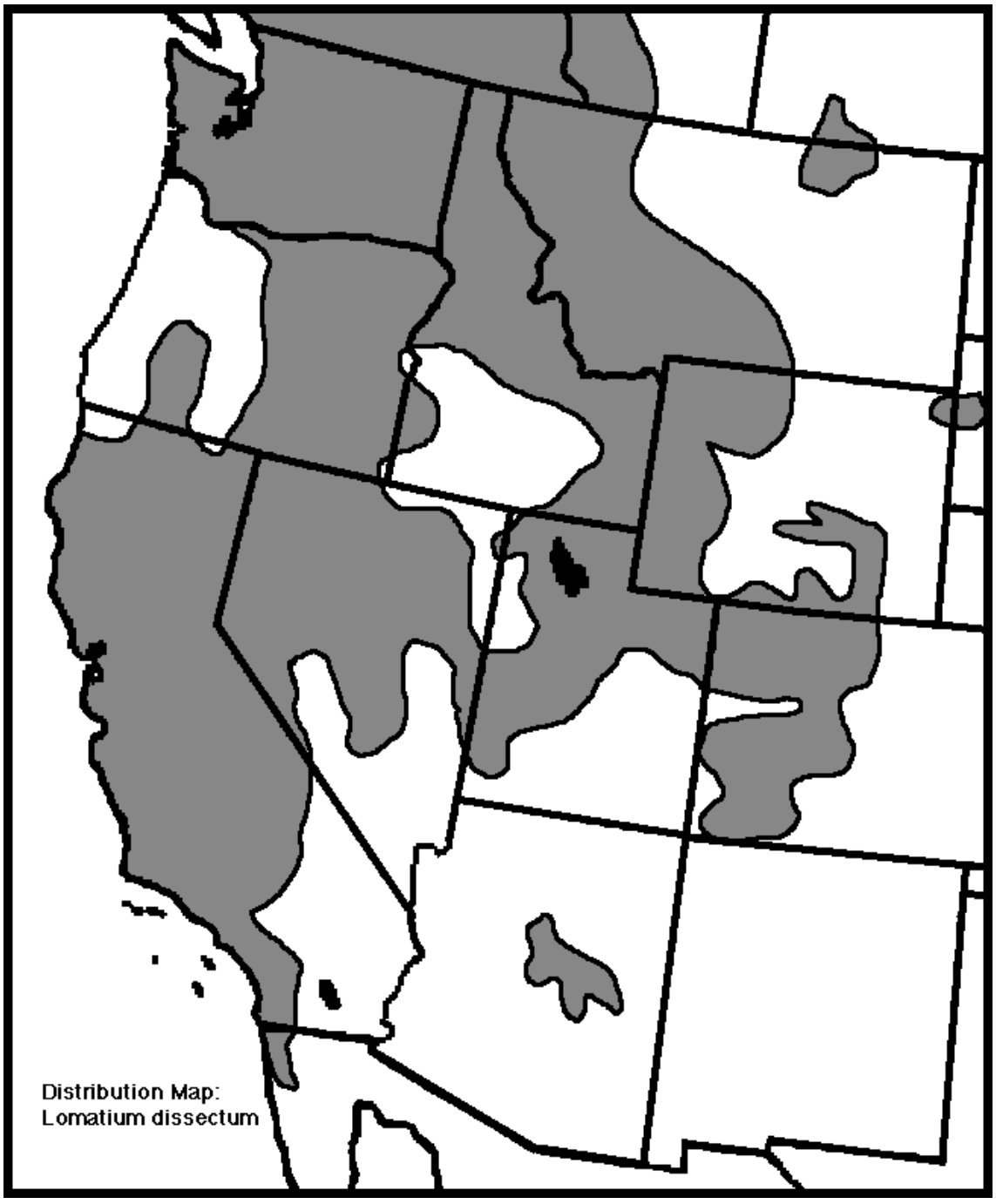
9. Does your state have any restrictions on collection of *L. porteri*? What legal measures are in place for the plant?

10. Are there any programs to conserve habitat for *L. porteri*? Do you monitor the plant in your protected areas?

11. Are any management measures in place for osha? How should ethical wildcrafting take place?

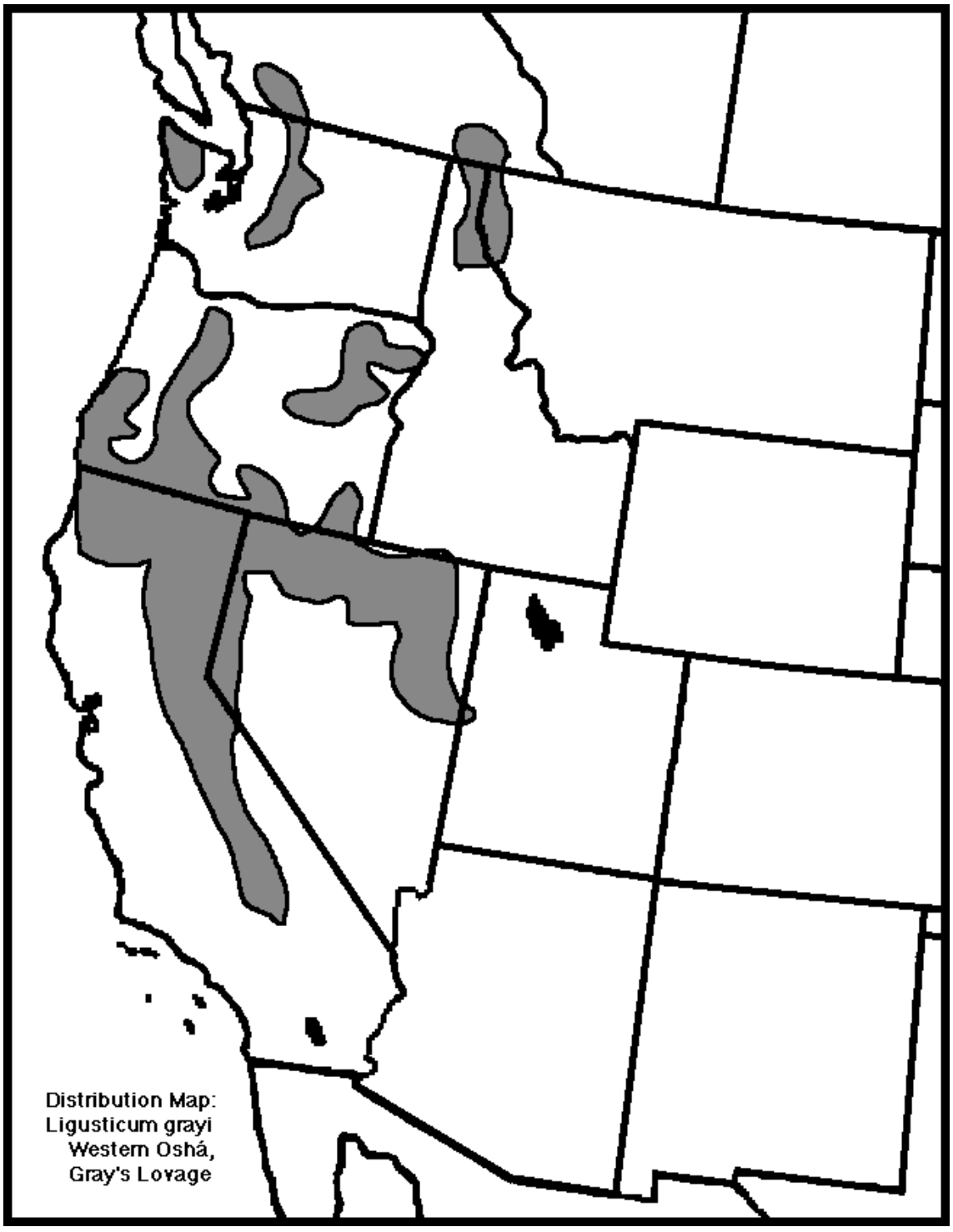
12. Can the plant be cultivated? Is anyone cultivating it?

9.3 Appendix III: Distribution Map of *Lomatium dissectum*



Map credit: Michael Moore's Southwest School of Botanical Medicine

9.4 Appendix IV: Distribution Map of *Ligusticum filicinum*



Map credit: Michael Moore's Southwest School of Botanical Medicine

9.4 Appendix V: Class Profile

Natalie Bailey

Natalie graduated Magna cum Laude, Phi Beta Kappa from Rhodes College in 1996 with a B.S. in Biology. She has experience in international conservation communications and fundraising with the Jane Goodall Institute and The Nature Conservancy's Latin American and Caribbean Division. Most recently, Natalie served as coordinator for the Jane Goodall Institute's Roots & Shoots National College Summit, an environmental and humanitarian program that brought together young adults and college students from across North America.

Kimberly Dumentat Benson

Kimberly holds a B.S. from the University of Maryland in marine biology and has completed extensive coursework in oceanography, engineering, and the physical sciences. She has been active in marine related fields through employment and volunteer activities for over eight years. Her most recent experience includes work for the Maryland Sea Grant College Program and the US Department of State, Office of Marine Conservation. Kimberly has also recently been awarded a John A. Knauss Marine Policy Fellowship.

Marina Cracco

Marina received a B.S. in Biology with an emphasis in Zoology at the University of La República, Uruguay. She has worked as a research assistant in an Organization of American States funded Ecotourism Policy Study at the University of Idaho, and as a consultant for the Hornocker Wildlife Institute. Marina has extensive experience in the translation of technical material from English to Spanish for UI faculty and for The National Association for Interpretation. She was a founding member and a volunteer in Asociación Vida Marina, an NGO focused on marine issues and environmental education in South America. Her interests include wildlife and general conservation issues in Latin America.

Gary Dodge

Gary graduated from UC San Diego in 1988 with a degree in Cognitive Science. He has since worked as a conservationist and as a biologist for the US Park Service in California and Alaska, US Fish and Wildlife Service in Minnesota, Peace Corps in Honduras, and most recently with Conservation International in Washington, DC. His research interests include avian conservation, habitat fragmentation, and the establishment and management of protected areas in Central and South America.

Laurie Duker

Laurie Duker has a B.A. in Sociology from Pomona College in California, and an M.B.A. from Yale University. She has worked as a lobbyist on Capitol Hill on international issues and as director of a non-profit organization. Laurie has research experience in whooping crane behavior, wetlands vegetation and wetland pollination systems.

Jose-Luis Izursa

Jose-Luis holds a M.Sc. degree in Higher Education from the Amazonic University of Pando, Bolivia and received his BS in biology, with a concentration in Ecology, from the University of San Simon, Bolivia. He worked for nine years in sustainable development and conservation issues at NGOs in his native country. For two years he has directed a Research Center for the preservation of the Amazon. His areas of interest include working with "campesinos" and local cultures for the conservation and sustainable use of their resources, environmental education and conservation of tropical forests of South America.

Kelly McConnell

Kelly attended Northeast Missouri State University, where she earned a B.A. in Biology and English and graduated magna cum laude. Kelly's research experience in Midwestern prairie systems and at the Archbold Biological Station in central Florida included rare and endemic plant conservation and native habitat restoration using prescribed fire. She is currently writing preserve management proposals for the

Washington, DC/Maryland Nature Conservancy Field Office. Kelly is also working on a community supported agriculture project with the Chesapeake Bay Foundation and the DC Capital Area Food Bank that provides a market for local organic produce to urban residents in the DC metro area.

Sarah McCourt

Sarah received a B.A. in Public Communications from the American University in Washington, DC. In the years before joining the CONS program, she worked in the field of media relations and public communications. During this time, she worked as Press Secretary for the League of Conservation Voters, an environmental political action committee, Deputy Press Secretary for U.S. Senator Dianne Feinstein from California, and Communications Director for the President's Council on Sustainable Development and the Natural Resources and Environment office of the U.S. Department of Agriculture. Her interests include conservation of coastal marine ecosystems with a focus on exotic invasive species.

Net Meredith

Net holds a B.A. in Anthropology from the University of Michigan in addition to 80 credits of post-bachelors coursework from Colorado State University in Ecology and Wildlife Biology. Her primary interest is sustainable development in agricultural communities. She spent last summer working on TNC's Carpenter Ranch, a working hay and cattle ranch in northwest Colorado. She has worked as a research assistant for both the Colorado Natural Heritage Program and an environmental engineering firm.

Elizabeth O'Neill

Elizabeth received a B.S. in Natural Resources from Cornell University in 1993. Since her graduation, Elizabeth spent two years working as an Environmental Scientist with an environmental engineering firm and two years as a Research Associate with the Global Environmental Issues group of ICF Incorporated, an environmental policy consulting firm. Elizabeth has also assisted with ecological field research on birds and insects in New York, monkeys in Kenya, and raptors and macaws in Honduras. Most recently, Elizabeth acted as a field correspondent for a rapid biological assessment of the Pastaza River in Ecuador and Peru conducted by Conservation International.

Karin Sypura

Karin holds a B.S. in Biology from Luther College. Karin currently works for The National Fish and Wildlife Foundation on fundraising for an initiative targeting invasive plant species. Karin has worked for the Global Environment Facility at UNDP on capacity development issues, as a Fisheries Extension Agent in the People's Republic of the Congo (where she developed a working knowledge of French), and for the National Marine Fisheries Service performing salmon surveys.