



Lewisia rediviva Pursh
(Portulacaceae).

Native Americans and Their PLANTS

Linking the Past with the Future

ABSTRACT

Seven nations of Native Americans in the US and Canada are using native plant species for restoration and to reintroduce populations of species of cultural significance due to habitat loss. The scope of their projects as well as the important environmental, cultural, and economic benefits resulting from their efforts are briefly described.

KEYWORDS: seedling, propagation, nursery, Blackfeet, Chippewa, Choctaw, Salish-Kootenai, Navajo, Ktunaxa Kinbasket, Mohawk

NOMENCLATURE: (plants) ITIS (1998); (insects) Julien and Griffiths (1998)

In response to their rich ethnobotanical heritage, the need for restoration, cultural education, and providing employment opportunities, at least 7 native nations developed native plant nurseries for restoration projects in recent years. Integration of culture and ecology is a distinctive feature of their restoration projects. The fields of restoration and traditional plant knowledge and use are closely linked in many respects. Traditional harvesting coincides with replanting of rhizomes, seeds, bulbs, or offshoots in the pocket of soil where a plant was extracted. For example, the Salish-Kootenai replant the regenerative part of the crown of bitterroot (*Lewisia rediviva* Pursh [Portulacaceae]). When replanted in the hole where the root had been extracted, the crown (the caudex) grows and develops a new root system (DeSanto1993). The pocket of disturbance serves as a microsite

for replanted propagules in the absence of competition the following year.

In other cases, rejuvenation of the population occurs in the case of those species dependant on some disturbance for increase.

Rhizomes were dug in a particular way to stimulate additional rhizome

development to grow into spur plants. This would ensure regrowth and sustainability. Collection of seeds, fruits, or branches involves the conservative practice of taking only a small quantity from any given individual or population. This is an ancient practice and continues today, not only for plant use but now also in the collection of seeds and cuttings for the purpose of restoration. Such case demonstrates the understanding of, and respect for, biological systems and is inherent in the beliefs and relationship between indigenous people

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and their environment. Habitat loss of many culturally significant species is an expressed concern by many elders, tribal ethnobotanists, cultural advisors, and biologists. Undeniably linked is the need for conservation of these species and continuance of traditional plant knowledge while addressing the immediate restoration. This approach has culminated in development of native plant nurseries, restoration efforts, and cooperative programs between native nations and agencies.

Blackfeet Nation of Montana

The Blackfeet Reservation is more than 600,000 ha (1.5 million ac) and encompasses a large expanse of northern short grass prairie with numerous wetlands, lakes, and rivers, as well as the interface with subalpine and alpine zones bordering Glacier National Park on the western boundary. The wide diversity of habitat and species illustrates the diversity of plants of cultural significance to the Blackfeet and the range of restoration plants needed for upcoming projects.

In 1998, a geodesic dome greenhouse (Figure 1) was constructed at the Blackfeet Community College in Browning, Montana. Wilbert Fish (greenhouse program manager and traditional Blackfeet herbalist) and his staff have successfully grown 53 native species for restoration and cultural-education purposes (Table 1). Emphasis on the cultural history and language is presented while species are under production (Figure 2), coinciding with the cultural education goals of the college and providing an opportunity to conduct horticultural trials with native species in a unique greenhouse environment.

Some traditional curative species being grown in the greenhouse include American licorice (*Glycyrrhiza lepidota* Pursh [Fabaceae]) and pale purple coneflower (*Echinacea pallida* (Nutt.) Nutt. [Asteraceae]). Key restoration species include serviceberry (*Amelanchier alnifolia* (Nutt.) Nutt. ex M. Roemer [Rosaceae]) and chokecherry (*Prunus virginiana* L. [Rosaceae]), which are also important traditional food plants. Several species of sedges (*Carex* spp. [Cyperaceae]) have been grown for

wetland and riparian zones on the reserve. Other species of ceremonial significance that have been grown include sweetgrass (*Hierochloa odorata* (L.) Beauv. [Poaceae]) and old man sage (*Artemisia ludoviciana* Nutt. [Asteraceae]).

In cooperation with Glacier National Park, the greenhouse is used to produce plants for campground restoration involving students from the Browning School District. Students collect seeds and assist in propagation and out-planting. Fish and his staff are currently growing culturally significant species for the Piegan Institute, which operates 2 total immersion Blackfeet Language schools and desires a cultural-botanical park for each school.

Ojibwa (Chippewa) of Minnesota

The Chippewa (Ojibwa) of Minnesota consists of 7 Bands: Bois Forte, Fond du Lac, Grand Portage, Leech Lake, Mille Lacs, White Earth, and Red Lake. Wild rice (*Zizania palustris* L. [Poaceae]) management on reserve lakes is a priority in order to enhance and restore wild rice production and

Figure 1 • The Blackfeet's geodesic dome greenhouse was selected for its contemporary structural design which would withstand high winds, accumulate maximum solar gain for growing plants during winter months, and coincide with traditional values of the circle.

Photo by Terry McGrath Photography



to increase nesting habitat for migratory waterfowl.

Just one of several restoration projects, the Fond-du-Lac Band near Duluth, Minnesota, is inventorying populations of wild rice using global positioning system (GPS) mapping techniques in conjunction with restoring 300 ha (750 ac) of formerly channelized, dammed, or altered wetlands and lakes to their former capacity with wild rice. David Wise, USDA Natural Resource Conservation Service (NRCS) tribal liaison, is coordinating the projects.

The White Earth Band of the Ojibwa are also involved in wetland restoration in Minnesota. Restoration of 3.5 km (2.2 miles) of the Wild Rice River, located south of Lower Rice Lake, came about due to the construction of a new bridge. As part of construction, the Minnesota Department of Transportation restored flow to a part of the river that for decades was diverted into a ditch parallel to the highway. The project restores hundreds of hectares of floodplain wetland and provides deep-water habitat for northern pike and other fish. The restored wetland will help moderate water-level fluctuations in Lower Rice Lake, thus reducing damage to young wild rice from high water in early summer (MDNR 1999). The project benefits native people, wild rice, fish, and wetland wildlife, which have been waiting more than 50 y for this river's recovery.

Choctaw Tribe of Mississippi

The Choctaw live within a species and habitat rich area of Mississippi. The forest is an oak-pine-hickory (*Quercus* L. [Fagaceae]-*Pinus* L. [Pinaceae]-*Carya* Nutt. [Juglandaceae]) association with a diverse subcanopy of several other species of oak, gum (*Liquidambar styraciflua* L. [Hamelidaceae]), and tall shrubs. Herb cover may reach 20% in forests that have been burned. In moist locations, switch cane (*Arundinaria gigantea* ssp. *tecta* (Walt) McClure [Poaceae]) may form dense cane-



Figure 2 • Pi-ne-mah-si or sticky geranium (*Geranium viscosissimum*) growing in the Blackfeet geodesic dome greenhouse.

TABLE 1

Plants grown by the Blackfeet

Scientific name	Family	Blackfeet name
<i>Arctostaphylos uva-ursi</i> (L.) Spreng.	Ericaceae	Ka-ka sin
<i>Amelanchier alnifolia</i> (Nutt.) Nutt. ex Roem.	Rosaceae	O-ko-nuk
<i>Echinacea angustifolia</i> var. <i>pallida</i> Nutt.	Asteraceae	Sik-doh-gee
<i>Eriogonum umbellatum</i> Torrey	Polygonaceae	OO- kak-see
<i>Gaillardia aristata</i> Pursh	Asteraceae	E-Nuk-En-Nee-Ga-Pono-Kooki
<i>Geranium viscosissimum</i> Fisch & Meyer ex Meyer	Geraniaceae	Pi-ne-mah-si
<i>Glycyrrhiza lepidota</i> (Nutt.) Pursh	Fabaceae	Mah-see-ye-poh-soh-goh-see
<i>Hierochloa odorata</i> (L.) Beauv.	Poaceae	Se-pat-semo
<i>Mahonia repens</i> (Lindl.) G. Don	Berberidaceae	Ot-squi-ei-na
<i>Populus tremuloides</i> Michx.	Salicaceae	As-si-tsix-im
<i>Pinus contorta</i> Dougl. ex Loud	Pinaceae	A-patakh-i

brakes. Species richness is also evident in the many types of wetlands common in this area.

The Mississippi Band of the Choctaw are dedicated to preservation of their cultural way of life and have recognized that plants of cultural significance are increasingly being threatened due to habitat loss. A cooperative effort between the Choctaw tribal council, Agriculture and Rural Development office, and NRCS has resulted in several innovative projects to address this problem. Three projects are addressed below.

Choctaw elders expressed concern about limited populations of switch cane on tribal lands. Switch cane is the largest native grass in North America, growing 2 to 8 m (6.5 to 26 ft) tall with stems up to 2 cm (1

in) in diameter. Cane fiber is used in Choctaw basketry, recognized worldwide as some of the most exquisite basketry, and is an important source of income for tribal basket makers. Chief Phillip Martin and the tribal council requested a collaborative project between the Choctaw and NRCS to transplant sections of cane back into suitable habitat on the reservation and also to introduce it in areas where it would be easily accessible by basket makers and elders (Figure 3). Tim Oakes, NRCS liaison, is investigating vegetative propagation of cane for these purposes and for slope and stream bank stabilization. Elders provided information on historic locations, which are being mapped by GPS.



Figure 3 • Choctaw members planting switch cane rhizomes.

A 7-ha (18-ac) section adjacent to the Pearl River will be restored with forest tree seedlings and cane. A vocational tribal greenhouse and nursery facility produces bareroot Nuttall's oak (*Quercus texana* auct. non Buckl. [Fagaceae]) and hickory (*Carya alba* (L.) Nutt. ex Ell [Juglandaceae]) for restoration and for wildlife food and cover values. The greenhouse employs tribal members who collect seeds and grow and maintain tree seedlings. Trees are also available to locals for backyard habitat enhancement on private land. Both species are of cultural significance to the Choctaw as traditional food sources (Moerman 1998). The traditional Choctaw stickball game (Ishtohboli) requires a pair of hickory stickball sticks. Preservation of existing wetlands and enhancement and installation of additional wetlands on tribal lands is a priority of the Choctaw, and they have been recognized for their initiative of tribal wetland projects. The Choctaw and Army Corps of Engineers recently agreed to restore and enhance tribal wetlands. Wetland protection and restoration by the Choctaw have set an example in the southeastern US.

Another cooperative project was development of the Wolf Creek Nature Trail, located at the Pearl River Community. The Choctaw intended to create a demonstration area focusing on environmental concerns, such as restoration, enhancement, and creation of wetlands and habitat for wildlife. Information

about plants encountered along the trails is in Choctaw and English, providing environmental education to school groups and visitors as well as an opportunity for youth to learn from elders and examine plants of cultural significance.

Confederated Salish-Kootenai Tribes of Montana

The Salish-Kootenai reservation ranges from 900 to 3000 m in elevation and includes shortgrass prairie, the Flathead River drainage, wetlands, and the forested west slope of the Mission Mountain Range on the eastern boundary.

The Salish-Kootenai constructed a nursery at their Salish-Kootenai College in Pablo, Montana, to pro-

vide plants for restoration of riparian zones in the Flathead River and its tributaries, and upcoming federal highway projects on the Flathead Reservation. The nursery is part of a program combining restoration, control of exotic weeds, and college curriculum. Instrumental in the program are JoAnne Bigcrane, ethnobotanist and liaison between tribal elders; Virgil Dupuis, restoration project manager; Pat Hurley, biology instructor at the College; Dawn Thomas-Swaney, nursery manager; and Joyce Lapp, restoration biologist at Glacier National Park.

Planning and preparation for this long-term program included looking for culturally significant species in proposed restoration areas and searching historical records to see if culturally significant species originally occurred on potential restoration sites. Historical records provide a means of accessing the effect of habitat loss and exotic invasion on populations. The Elders participation was invited to oversee the selection of native plants for restoration projects, and suggest how appropriate care and handling was to be given to the plant species and materials. The nursery includes 2 greenhouses, a shadehouse, and 4 outdoor mistbeds for vegetative propagation. Student interns from the College assist with seed collection and propagation



Figure 4 • Dawn Thomas-Swaney collecting hardwood willow cuttings along the Flathead River in Montana.



Figure 5 • Michael Keefer (left) and Pete McCoy (right) collecting seeds.

and production of plants. The College's restoration ecology curricula prepares students for local employment on the project as well as other opportunities in restoration and horticulture, as they take an active role in management of their land.

As part of the program, the Salish-Kootenai plan to involve tribal members in contract production of bareroot woody material and establishment of seed grass orchards for other restoration projects.

Of the 80 ha (200 ac) of proposed riparian restoration, the Salish-Kootenai are starting with conversion of a 24-ha (48-ac) pasture on a floodplain along the Flathead River (Figure 4). Their objectives are to reestablish the historic floodplain by reintroducing willow (*Salix* spp. [Salicaceae] and Black cottonwood (*Populus trichocarpa* Torr. & Gray ex Hook [Salicaceae] to the shoreline, enlarging and rehabilitating the existing wetlands with sedges, rushes [*Juncus* spp. [Juncaceae], and native shrubs and to reestablish the adjacent ponderosa pine (*Pinus*

ponderosa Dougl. [Pinaceae] and Rocky Mountain juniper (*Juniperus scopulorum* Sarg. [Cupressaceae] forests. Existing populations of the culturally significant species American plum (*Prunus americanus* Marsh. [Rosaceae]) will be revitalized and augmented as well.

Plants for this project include red oiser dogwood (*Cornus sericea* L. [Cornaceae]), woods rose (*Rosa woodsii* Lindl. [Rosaceae]), willow (*Salix* spp.), thin leaf alder (*Alnus incana* (L.) Moench [Betulaceae]) and snowberry (*Symphoricarpos albus* (L.)

Blake [Caprifoliaceae]). Rooted cuttings of Bebb's willow (*Salix bebbiana* Sarg. [Salicaceae]), and black cottonwood are being grown for a 10-ha (20-ac) restoration project along the Jocko River.

The reservation has an extensive exotic weed problem. Success of restoration projects is contingent on control of weeds.

JoAnne Bigcrane works

closely with the Reservation's Weed Division to examine the impact of herbicides on native species. Linda Weaselhead manages an insectary where sulphur knapweed moth (*Agapeta zoegana* L. [Lepidoptera: Tortricidae]) and knapweed root weevil (*Cyphocleonus achates* Führ. [Coleoptera: Curculionidae]) are grown for biological control of spotted knapweed (*Centaurea maculosa* L. [Asteraceae]).

The Salish-Kootenai have a restoration program others should emulate. Their program encompasses many aspects important to their culture, including careful planning and development of policies and protocols with tribal elders, conservation and protection of culturally significant plants, development of a nursery, exotic plant management, a curriculum for the field of restoration, and emphasis on providing employment for tribal members.

Ktunaxa Kinbasket of British Columbia

Ktunaxa Kinbasket lands are very diverse in vegetation, ranging from the dry, ponderosa pine-bunchgrass (*Elymus spicatus* (Pursh)

Gould [Poaceae]) zone to the coastal western hemlock (*Tsuga heterophylla* (Raf.) Sarg. [Pinaceae]) zone and in some places, subalpine and alpine zones.



Figure 6 • Sweetgrass baskets.

The need for restoration of hydro-electrical right-of-way on Ktunaxa Kinbasket land prompted development of an on site indigenous plant nursery on the north end of the St Mary's Reserve near Cranbrook, British Columbia. Michael Keefer is ethnobotanist and Pete McCoy serves as cultural advisor and liaison between elders and the ethnobotany program. Keefer and McCoy have collected seeds for several projects (Figure 5). One major contract with Columbia Power Corporation involves growing huckleberry (*Vaccinium membranaceum* Dougl. ex Hook [Ericaceae]), ninebark (*Physocarpus malvaceus* (Greene) Kuntze [Rosaceae]), chokecherry, snowbrush (*Ceanothus velutinus* Dougl. [Rhamnaceae]), and red stem ceanothus (*Ceanothus sanguineus* Pursh [Rhamnaceae]) from seeds, and snowberry and willow will be vegetatively propagated. With this great range of diversity and the need for restoration in many areas, Keefer sees the challenge of growing many additional species. Experimentation and refining the growth requirements for diverse species under greenhouse conditions is necessary for future projects.

A youth ranch, in conjunction with the nursery, is under development and will involve horticulture apprenticeships and employment for youth. The nursery and ranch provide jobs and skills and ensure use of site specific nursery stock.

Mohawk Nation of New York

The St Regis Mohawk Reservation includes 5666 ha (14,000 ac) in New York and additional land across the border in Canada. The vegetation is a mosaic of eastern hardwood deciduous and coniferous forest bordering the Hudson River. In cooperation with NRCS, the Mohawk are developing a wetland enhancement project involving the Akwesasnie Freedom School. Students from the school will be involved in seed collection of wetland species that are also of cultural significance, growing and planting plugs, as well as gaining knowledge of the traditional uses of these species from participating elders. Plugs will be grown or sections transplanted from adjacent wetlands and planted in the wetland zone of 3 newly constructed ponds. Also, members of a

tribal environmental task force collect and transplant viable rhizome sections of sweetgrass for restoration of this important component in traditional basketry (Figure 6).

Navajo Nation of Arizona and New Mexico

The Navajo Nation is the largest reservation (6500 km² [1.6 million ac]) in the US. Pinon-juniper woodlands (*Pinus edulis* Engelm. [Pinaceae]–*Juniperus* spp. [Cupressaceae]) are an important vegetation component of the reservation and contain many species of cultural significance to the Navajo people. The tribal nursery is located in Fort Defiance, Arizona, and consists of several greenhouses, a lathhouse, seed extractory, and warehouse. Recently, the nursery has also successfully propagated 36 additional native species (130,000 per year) for restoration projects on the reservation, species that are culturally significant and important for wildlife. (Table 2). The nursery also produces 1,000,000 forest tree seedlings per year (Figure 7).

The nursery employees 9 to 27 tribal members and works with grad-

TABLE 2

Plants grown by the Navajo

Common Name	Family	Scientific Name
Smooth sumac	Anacardiaceae	<i>Rhus glabra</i> L.
Skunk bush sumac	Anacardiaceae	<i>Rhus trilobata</i> Nutt.
Fringed sagewort	Asteraceae	<i>Artemisia frigida</i> Willd
Old man sage	Asteraceae	<i>Artemisia ludoviciana</i> Nutt.
Black sagebrush	Asteraceae	<i>Artemisia nova</i> A. Nels
Big sagebrush	Asteraceae	<i>Artemisia tridentata</i> Nutt.
Rubber rabbitbrush	Asteraceae	<i>Chrysothamnus nauseosus</i> (Pallas ex Pursh) Britt.
One seed juniper	Cupressaceae	<i>Juniperus monosperma</i> (Engelm.) Sarg.
Utah juniper	Cupressaceae	<i>Juniperus osteosperma</i> (Torr.) Little
Rocky Mountain juniper	Cupressaceae	<i>Juniperus scopulorum</i> Sarg.
Gambel's oak	Fagaceae	<i>Quercus gambelii</i> Nutt.
Utah serviceberry	Rosaceae	<i>Amelanchier utahensis</i> Koehne
Curl leaf mountain mahogany	Rosaceae	<i>Cercocarpus ledifolius</i> Nutt.
Birch leaf mountain mahogany	Rosaceae	<i>Cercocarpus montanus</i> Raf
Apache plume	Rosaceae	<i>Fallugia paradoxa</i> (D.Donn.) Endl
Chokecherry	Rosaceae	<i>Prunus virginiana</i> L.
Cliff rose	Rosaceae	<i>Purshia mexicana</i> (D.Donn.) Henrick.
Golden currant	Rosaceae	<i>Ribes aureum</i> Pursh
Woods rose	Rosaceae	<i>Rosa woodsii</i> Lindl.
Cottonwood	Salicaceae	<i>Populus angustifolia</i> James
Coyote willow	Salicaceae	<i>Salix exigua</i> Nutt.
Scouler willow	Salicaceae	<i>Salix scouleriana</i> Barratt



Figure 7 • Production greenhouse operated by the Navajo Nation.

uate students from the University of New Mexico. Amanullah K Arbab manages the nursery and has developed a native plant botanical garden at the nursery. The garden serves as a learning tool for young Navajo school children that visit the nursery to learn first hand the cultural, ceremonial, and medicinal uses of native plants and principles of restoration and ecosystem mangement.

The Navajo face many challenges for restoration on the reservation, and are studying microflora associated with reestablishing native plants following coal mine reclamation.

Summary

Native American restoration projects are addressing the need for providing skills and opportunities for tribal members and for restoring landscapes for future generations. The vast botanical knowledge of the indigenous people was accumulated through intensive observation of the environment in which they lived for thousands of years. Traditional indig-

enous resource management engaged restoration with harvest, inferring that continuance of culture is intertwined with the health of the ecosystem.

Today, restoration on indigenous lands is a concept whose time has come in many areas of North America. The challenges of growing native species and researching methodology for restoration while integrating traditional beliefs and management practices is of great importance as many nations and agencies work to restore affected landscapes. These challenges can be approached successfully from the traditional cultural perspective.

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