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Commercial Morel Harvesters and Buyers in Western Montana: An Exploratory Study of the 2001 Harvesting Season

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Cover photo: Extensive wildfires in the Bitterroot Valley during summer 2000 created excellent conditions for an abundant morel crop in summer 2001. Several thousand pickers worked the “burns” from May through July. Andrew Mark, depicted in this photo, picked morels to offset transportation and living expenses associated with assisting Erika Mark McFarlane in this research.

Abstract

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This exploratory study examined aspects of the social organization of the commercial wild morel industry in western Montana during 2001. We talked with 18 key informants (7 buyers and 11 pickers) and observed social interactions at one buying station near the Kootenai National Forest and three buying stations near the Bitterroot National Forest. The key informant and observational data permitted us to construct a picture of social interactions at field buying stations, buyer strategies for attracting pickers, changes in prices over the course of a season, and the ways in which various participants in the wild morel harvest construct their livelihoods. In the discussion, we contrast our findings with the results of a recently published study on nontimber forest product harvesters in the Eastern United States. We end the report with a discussion of management implications for managers and scientists.

Keywords: Nontimber forest products, special forest products, livelihood strategies, wild mushrooms.

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Introduction

An unusually dry spring in 2000 set the stage for a series of wildfires that burned more than a million acres of national forest land in the northern Rockies during the summer (USDA FS 2001). Wildfires covering more than 1,000 acres took place in 17 national forests in Idaho and Montana (USDA FS 2001). Three national forests—the Payette, Salmon-Challis, and Bitterroot—experienced exceptionally large fires covering 150,000 acres or more (USDA FS 2001). Six forests—Boise, Beaverhead-Deerlodge, Custer, Helena, Kootenai, and Lolo—each had fires that burned between 25,000 and 50,000 acres (USDA FS 2001).

In the Western United States, morel mushrooms (*Morchella* spp.) frequently fruit abundantly in the year immediately following a fire in coniferous forests (Pilz et al. 2004). With burns covering more than a million acres (see fig. 1), forest managers in the Northern Region (Region 1) anticipated the presence of a large morel crop in western Montana during summer 2001. To prepare the national forests in Idaho and Montana for the upcoming morel season, the special forest products coordinator for Region 1 organized a workshop and a series of email conversations for region and forest employees beginning in fall 2000. During the workshop and email discussions, staff from the regional office and forests articulated the following concerns regarding the upcoming morel season:

- Potential for conflict between local pickers and visiting pickers.
- Potential negative effects of mushroom harvesting activities and associated camping on threatened and endangered species.
- Concern that commercial harvesters would occupy the majority of the forests' undeveloped campsites at the expense of recreational forest users.
- Concerns about ensuring picker safety and protecting the Forest Service from liability for pickers injured by falling snags.
- Hesitancy to implement an overly rigid enforcement program, given the low economic returns for most pickers and high rates of unemployment in some areas, particularly the Kootenai National Forest.

Besides the concerns listed above, participants in the discussions indicated that lack of information about the social aspects of the wild morel industry hindered the ability of the USDA Forest Service to manage morels. Participants noted that they understood little about how morel buyers operate, who participates as pickers and buyers, or how wild morel markets work. Consequently, forest managers had difficulty projecting how policies they put into place would affect the commercial wild morel industry.

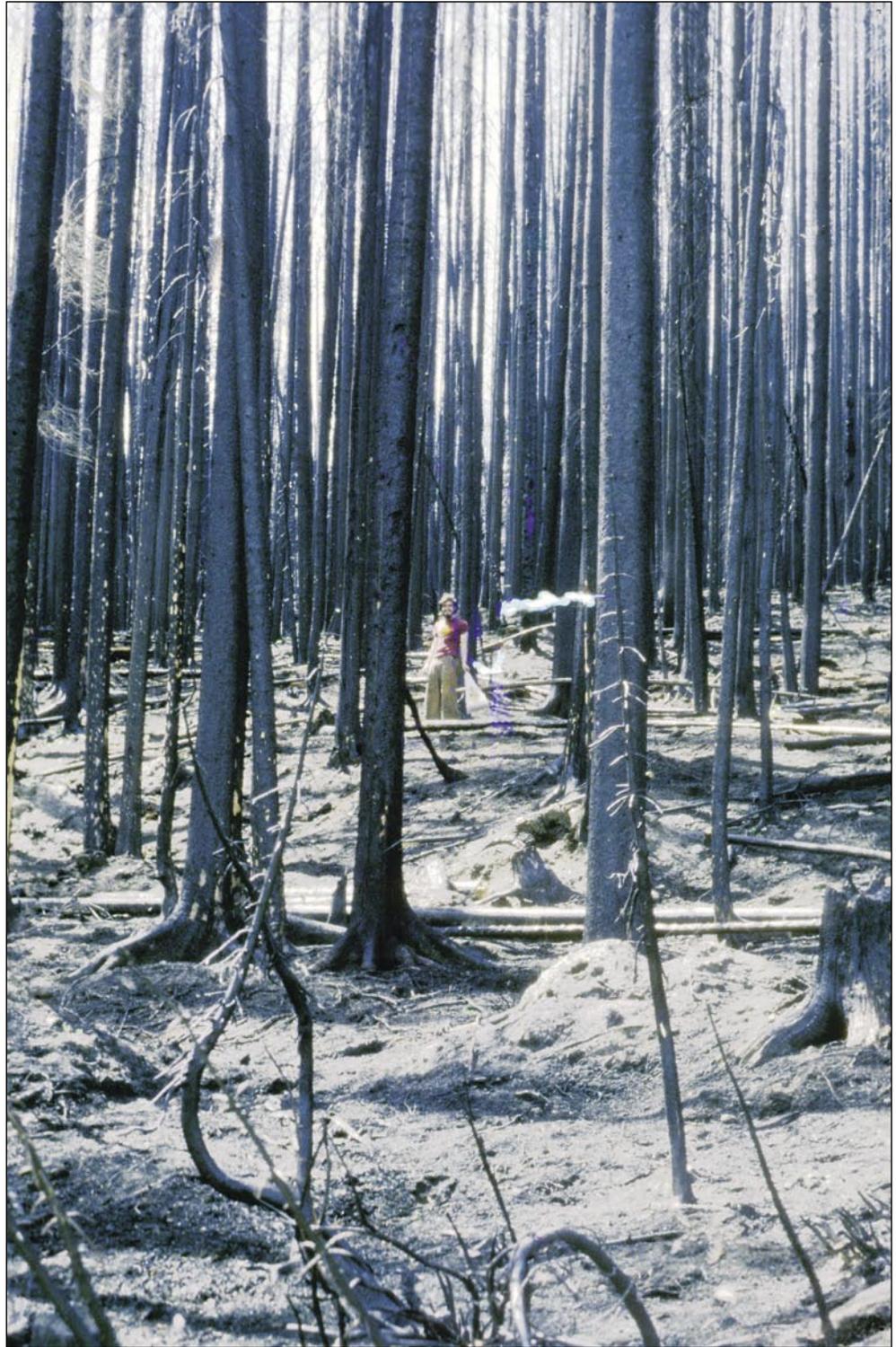


Figure 1—Although fires burned throughout much of western Montana during summer 2000, the Bitterroot Valley experienced the most intense and extensive fires of the season. Burns differed in severity, ranging from very intense crown fires such as the one that passed through the forest stand depicted in this photo, to low-intensity fires that consumed only ground cover.

Thus, the purpose of this exploratory study was to provide forest managers and scientists with an understanding of the following social aspects of commercial wild mushroom harvesting in western Montana:

- Ways in which wild mushroom buyers and pickers participate in the harvest.
- How the wild morel harvest fits within the overall livelihood strategies of pickers and buyers.

The data-gathering portion of this study took place between September 2000 and September 2001. The research focused on wild morel harvesting activities and policies on the Bitterroot and Kootenai National Forests (fig. 2).



Figure 2—Kootenai and Bitterroot field sites visited during summer 2001.

Study Description and Methods

With information gleaned from Forest Service employees and mushroom pickers and buyers, the research team selected sites in the Kootenai and Bitterroot National Forests. Both the Kootenai and Bitterroot had experienced major burns on a regular basis since the mid-1980s. Additionally, the Kootenai and Bitterroot had large concentrations of harvesters and pickers in nearby towns, such as Libby and Darby, making it possible for the field researcher to easily establish several contacts in one locality on each forest.

Discussions were conducted with key informants among pickers, buyers, and Forest Service employees at the field sites. The field researcher talked with 4 groups of buyers (3 in the Bitterroot Valley and 1 in Libby), 11 harvesters (7 in the Bitterroot Valley and 4 in Libby), and 10 USDA Forest Service employees. The harvesters included eight Caucasians, one Cambodian, one Laotian, and one Latino. The four buying groups consisted of three all-Caucasian groups and one group composed of two Caucasians and one Southeast Asian. The field researcher asked key informants to provide information about harvester and buyer characteristics, morel markets, views on regulations, and morel habitat and productivity.

The field researcher recorded notes of conversations with key informants by hand, using Emerson et al. (1995) as a guide for note-taking format. She opted not to tape the conversations because of the noisy conditions in which many of the interactions took place (often near busy highways), and thus the likelihood of difficulty in transcribing the conversations. The field researcher also kept a daily record of observations about the buying stations and social interactions taking place in and around the stations throughout the field study.

The discussions with pickers and buyers took place during 4-day visits to each site the first 2 weeks of June—during the fifth week of the morel season in the Kootenai Valley and the third week of the season in the Bitterroot Valley. Following Bernard (1994), the data were grouped into four broad topics: market conditions, livelihood strategies, policy issues, and morel ecology. Region 1 managers had indicated that these were issues that they knew little about (from the perspective of pickers and buyers), and believed that it would be useful for management purposes to have more information on them. The data on market conditions and livelihood are presented here.

On the basis of work done by McLain (2000), Emery (1998), and Love et al. (1998), the following characteristics were used to distinguish livelihood strategies of the informants: place of residence relative to harvest location (an indicator of mobility), length of time in the industry, proportion of the year spent working in the industry, and access to other sources of income. In addition, previous studies

of NTFP harvesters in the Pacific Northwest suggested that differences might exist between pickers and buyers of different ethnic backgrounds (Hansis 1998, Love et al. 1998, Lynch and McLain 2003, Richards and Creasy 1996). Matrices of these characteristics for the harvesters and buyers (tables 1, 2, and 3) were used to construct the textual description of livelihood strategies.

Table 1—Examples of buyer livelihood strategies in western Montana, 2001

Buyer	Main residence	Ethnic group	Lives in field site	Years as buyer	Months per year buying	Other income sources or subsistence activities
B1	Montana	Caucasian	Yes	14	~7–8	Roofing, matsutake buying, *mushroom picking, *beargrass harvesting
B3a	Oregon	Caucasian	No	5	~7–8	Field buying station coordinator for matsutake harvest, mushroom processing and packing, (fishing)
B3b	Oregon	Caucasian Caucasian	No No	5 10	~7–8	Field buying station coordinator for matsutake harvest, mushroom processing and packing, (fishing)
B2a	Oregon	Caucasian	No	3	12	Mushroom packing, fall and winter mushroom buying
B2b	Oregon	Caucasian	No	10	12	Fall and winter mushroom buying
B2c	California	Southeast Asian	No	4	12	Translating, fall and winter mushroom buying
B4	Montana	Caucasian	Yes	14	~7–8	Collecting antlers for making dream catchers, jewelry, and lamps, matsutake buying, huckleberry picking and buying, (hunting)

* = past occupation, () = subsistence activity

Table 2—Examples of picker livelihood strategies in the Kootenai Valley, 2001

Picker	Residence	Ethnic group	Lives in field site	Years picking morels	Full-time picker?	Other income sources or subsistence activities
K1	Montana	Caucasian	Yes	3+	No	Seed collector, *Forest Service employee 20 years, *logger 12 years
K2	Oregon	Caucasian	No	8+	No	Matsutake picker, landscape laborer, ski area employee*
K3	Montana	Caucasian	Yes	Several years	No	Gold panning, huckleberry picking
K4	Montana	Caucasian	Yes	First year	No	Huckleberry picking, gold panning, making jewelry and knife handles from antlers, Navy veteran with disability payments, *postal worker, (fishing, hunting)

* = past occupation, () = subsistence activity

Table 3—Examples of picker livelihood strategies in the Bitterroot Valley, 2001

Picker	Residence	Ethnic group	Lives in field site	Years picking morels	Full-time picker?	Other income sources or subsistence activities
B1	Oregon	Caucasian	No	<1 (several years—matsutake)	No	Woodworking [lamps from juniper wood], matsutake picking, *logging
B2	Oregon	Caucasian	No	<1 (several years—matsutake)	No	Military veteran with disability payments, matsutake picking, *logger—25 years
B3	Oregon	Caucasian	No	2	No	Professional guitar player, bolete picking, (hunting and fishing)
B4	Oregon	Latino	No	7+	No	Cone collecting, fall and winter mushroom picking, *forest firefighter
B5	Oregon	Cambodian	No	9	No	Salal and beargrass harvesting, fall mushroom picking, *furniture seller/fabric cutter
B6	California	Laotian	No	2 (several years—matsutake)	Yes	Matsutake picking
B7	Oregon	Caucasian	Yes	5+	No	Construction, fall mushroom picking

* = past occupation, () = subsistence activity

Given the exploratory nature of this study, the research findings are limited in depth and scope. Three limitations of the study warrant specific mention. First, although an effort was made to select key informants from the four major ethnic groups active in the harvest (Caucasian, Laotian, Cambodian, and Latino), the sample nonetheless drew disproportionately from the Caucasian picker population. The reasons for this include the difficulty for an outsider to gain sufficient trust with pickers of cultures different from her own during such a short period, as well as linguistic barriers. A second limitation of the study is that the observational data, such as prices and pounds purchased per day, are limited to a small portion of a much longer season. Third, the study does not address differences in the social characteristics of the Montana morel industry across seasons.

Social and Ecological Context

The Kootenai and Bitterroot National Forests are located in the far western corners of Montana, with the Kootenai occupying the northwestern corner and the Bitterroot situated roughly 200 miles south in the southwestern corner (see fig. 2). A portion of the Bitterroot National Forest also extends into Idaho.

Bitterroot National Forest

The Bitterroot National Forest surrounds the Bitterroot Valley, a long wide valley in western Montana. The Bitterroot Valley stretches 83 miles from the city of Missoula at its north end, to the small town of Sula near its southern tip. The Bitterroot

Range forms the valley's western border; the Sapphire Range bounds the valley to the east. The valley floor is 3,200 feet above sea level, with the mountains around it 7,000 to 10,000 feet in elevation (USDA FS Bitterroot National Forest, n.d.).

Habitat types within the forest's boundaries include grasslands and forest stands composed primarily of ponderosa pine (*Pinus ponderosa* Dougl. ex Loud.) in the drier, lower elevations (USDA FS Bitterroot National Forest, n.d.). Mixed coniferous forests dominated by Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco), lodgepole pine (*Pinus contorta* Dougl. ex Loud.), and western larch (*Larix occidentalis* Nutt.) are common in mid-elevations (USDA FS Bitterroot National Forest, n.d.). The high-elevation alpine forests are composed mostly of Engelmann spruce (*Picea engelmannii* Parry ex Engelm.), subalpine fir (*Abies lasiocarpa* (Hook.) Nutt.), subalpine larch (*Larix lyallii* Parl.), and whitebark pine (*Pinus albicaulis* Engelm.) (USDA FS Bitterroot National Forest, n.d.).

Annual precipitation averages 12 to 15 inches in the Bitterroot Valley, and 40 to 80 inches in the surrounding mountains (Montana Natural Heritage Program 1998). In the mountains, much of the precipitation falls in the form of snow. The winters are cold and snowy with an average low in January of 17.8 °F (Montana Department of Labor and Industries 2004). The summers are hot and dry with an average high of 82.8 °F (Montana Department of Labor and Industry 2004). Most of the Bitterroot National Forest lies within Ravalli County, Montana, which covers 2,394 square miles (Montana Natural Heritage Program 2003). The county had a population of 36,070 in 2000, with a population density of 15.1 inhabitants per square mile (U.S. Census Bureau 2000). Most of Ravalli County's inhabitants live in the Bitterroot Valley. Incorporated towns adjacent to the Bitterroot National Forest include Florence, Hamilton, Stevensville, Corvallis, Darby, Sula, and West Fork. Hamilton, which has a population of 3,705 (U.S. Census Bureau 2000), serves as the valley's major trading center and is also the county seat. The unemployment rate for Ravalli County was 4.6 percent in 2000, equal to the state average (U.S. Census Bureau 2000). The median household income was \$31,992, and the per capita income was \$17,935 (U.S. Census Bureau 2000).

Kootenai National Forest

Located roughly 200 miles north of the Bitterroot Valley, the Kootenai National Forest surrounds the Kootenai and Thompson River valleys in the far northwestern corner of Montana. Both valleys are long and narrow, with little land flat enough for farming or ranching. The Kootenai Valley area is the lowest point in Montana, with elevations ranging from 1,820 feet on the valley floor to 8,700 feet in the surrounding mountain ranges (Lincoln County Emergency Management Agency 2003). Four

mountain ranges—the Purcell, Cabinet, Coeur d’Alene, and Salish—lie within the boundaries of the forest.

Unlike the Bitterroot National Forest, which has large areas of grassland and scrublands, the Kootenai National Forest is nearly entirely composed of forest land. Habitat types include mixed-conifer stands with Douglas-fir and western hemlock (*Tsuga heterophylla* (Raf.) Sarg.) the dominant overstory species at low and mid-elevations (2,000 to 5,000 feet); small areas of ponderosa pine with western larch on drier locations at low and mid-elevations; stands dominated by western redcedar (*Thuja plicata* Donn ex D. Don) and hemlock in moist areas, and subalpine fir and Engelmann spruce stands at higher elevations (USDA FS Kootenai National Forest 1987). Large stands of dense lodgepole pine exist in some watersheds (USDA FS Kootenai National Forest 1987).

Average annual precipitation in the Kootenai ranges from 30 inches in the lower elevations to more than 60 inches in the Cabinet Range (Lincoln County Emergency Management Agency 2003). Much of the precipitation in the higher elevations falls in the form of snow. The winters are wet, but mild compared to other parts of Montana. The summers are typically warm and dry. The average low temperature in January in the town of Libby is 15.5 °F, and the high is 31.5 °F (Lincoln County Emergency Management Agency 2003). In July, the warmest month of the year, the average high is 87.8 °F and the average low is 46.1 °F (Lincoln County Emergency Management Agency 2003).

The Kootenai National Forest is situated primarily within Lincoln and Sanders Counties. Major settlements near the forest’s boundaries include Eureka, Libby, and Troy. Lincoln County encompasses 3,613 square miles and had a population of 18,835 in 2000, with a population density of 5.2 persons per square mile (U.S. Census Bureau 2000). Libby, with a population of 2,800, is the Lincoln County seat and the county’s political and economic center (U.S. Census Bureau 2000). Economically, Lincoln County is one of the poorest counties in Montana. The unemployment rate in 2000 was 11.3 percent (U.S. Census Bureau 2000), nearly twice as high as the state average and the rate in the Bitterroot Valley. The median household income in 2000 was \$26,754, and the per capita income in Lincoln County was \$13,923 (U.S. Census Bureau 2000). Both figures are significantly lower than those for the state and the Bitterroot Valley.

Recent Economic Changes in the Study Areas

From the 1950s to the late 1980s, timber harvesting constituted the dominant land management activity on both national forests, providing many local residents with jobs in the forest fiber industry (Russell and Adams-Russell 2004, Swanson

2001). Since the 1980s, however, timber harvesting and processing activities have declined, resulting in the closure of local wood processing facilities and extensive layoffs of mill and woods workers (Russell and Adams-Russell 2004, Swanson 2001). These changes have affected communities in the Kootenai Valley much more severely than the communities in the Bitterroot Valley.

The difference in how the two areas have adjusted to economic restructuring is most likely due to several factors, including differences in land ownership patterns, remoteness, and climate. Private smallholders occupy a much larger percentage of the land area (24 percent) in Ravalli County relative to Lincoln County (8 percent) (Montana Natural Heritage Program 2003). Settlements in the Kootenai Valley are also much further removed from major population centers, transportation routes, health care facilities, high-paying job opportunities, and institutions of higher education than the towns in the Bitterroot Valley.

The Forest Service's emphasis on managing the Western United States' national forests primarily for timber production between the late 1940s and the late 1980s masked the role of those forests as sources of a wide variety of nontimber forest products, such as huckleberries, moss, floral greens, seed cones, medicinal plants, and wild edible mushrooms (Antypas et al. 2002). Although typically less remunerative than much of the work associated with the wood products industry, nontimber forest product harvesting, processing, and buying provided rural and urban people alike with access to income-generating opportunities that occasionally supported an entire livelihood, but more often served as important sources of supplemental income, particularly during economic downturns (Emery 1998, 2002; Emery et al. 2002; Lynch and McLain 2003).

Until the late 1970s, national forests developed and enforced few regulations governing public access to many nontimber forest products (Antypas et al. 2002). Individual ranger districts, however, had the discretion to develop rules restricting access to nontimber forest products (Lynch and McLain 2003, McLain 2000, Parks and Schmitt 1997). Many ranger districts opted to focus on regulating wood products, such as firewood, posts and poles, boughs, and Christmas trees, which ranger districts could manage by using funds generated from the sale of timber under the reforestation provisions of the Knutsen-Vandenberg Act of 1930. Few, if any, ranger districts in the Western United States regulated wild mushrooms before the 1980s (McLain 2000).

Beginning in the 1980s, domestic and international consumer demand for wild edible mushrooms from the Western United States gradually increased (Alexander et al. 2002). The subsequent rise in the number of people seeking to harvest wild mushrooms on western national forests prompted the Forest Service to develop

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rules to regulate access to wild mushrooms and limit the areas where commercial harvesters could camp (McLain 2000, Parks and Schmitt 1997). The Pacific Northwest Region, which encompasses the states of Oregon and Washington, took the lead in developing rules that enabled the agency to begin tracking wild mushroom harvesting activities and to put into place mechanisms for controlling the flow of pickers within picking areas (McLain 2000).

In a survey of wild-mushroom buyers conducted in 1992, economists Schlosser and Blatner (1995) identified more than 10 species harvested commercially in the states of Oregon, Washington, and Idaho. Four types—morels (*Morchella* spp.), boletes (primarily *Boletus edulis*), chanterelles (*Cantharellus* spp.), and American matsutake (*Tricholoma magnivelare*)—composed the majority of both the volume and the value of the wild mushrooms harvested by the buyers included in the survey (Schlosser and Blatner 1995). Schlosser and Blatner estimated the economic contribution of wild mushroom markets to the regional economy of Washington, Oregon, and Idaho at \$41.1 million in 1992 (Schlosser and Blatner 1995).

Commercial wild mushroom species fruit less consistently in the northern Rockies than in Washington and Oregon. However, over the past 20 years, pickers have learned they can often find large quantities of morels in the northern Rockies in years following major forest fires. As long as commercial demand for morels remains strong, the occurrence of large forest fires in the forests of the northern Rockies is likely to draw pickers to Montana and Idaho during the months of June and July.

The northern Rockies constitute just one potential set of the many geographically dispersed sites available to mushroom pickers in the Western United States and Canada. Commercial pickers can pick morels from 6 to 8 months during a year, depending on the season and their willingness to move from one fruiting site to the next. Pickers following the morel circuit typically begin harvesting in northern California and southwestern Oregon in late February to early March. As the air and soil temperatures rise and the snow in the mountains begins to melt, usually between mid-March to mid-May, circuit pickers move north and east to morel grounds located along the east side of the Cascade Range in Washington and Oregon.

Depending on the season, and the location of large fires in the previous years, around mid to late May circuit pickers shift to the mountains of eastern Oregon and southern Oregon and to low-elevation harvest sites in Idaho and Montana. A few pickers follow the circuit up into Canada and Alaska during July and August. Others remain in the Rockies, Cascades, and the northern Sierras, moving upward in elevation as the summer advances. Although gray morels can fruit as late as

October in parts of the northern Rockies,¹ most circuit pickers start picking matsutake or chanterelles in Canada, Oregon, or Washington by mid-September.

Many ethnic groups participate in the morel harvest, including Native Americans and immigrants and native-born Americans of European, Laotian, Khmer, Mien, Hmong, Vietnamese, Mexican, and Central American descent. Undocumented workers from Mexico and Central America also participate in the harvest.

The relative percentage of different ethnic groups is difficult to estimate. However, an analysis of 1994 permit data from national forests in eastern Oregon indicated that 51.3 percent of the pickers obtaining permits had Southeast Asian surnames, 44.2 percent had Euro-American surnames, and 4.5 percent had Latino surnames (Parks and Schmitt 1997). The same data indicated that 73 percent of the pickers who had obtained permits came from other locations, and only 27 percent lived near the harvesting location (Parks and Schmitt 1997).

Morel Ecology

To understand the social organization of the wild mushroom industry in the northern Rockies, it is helpful to know a bit about morel ecology. Several species of morels occur in the intermountain West. True morels, which belong to the genus *Morchella*, are easy to distinguish from other mushrooms, but taxonomists have had difficulty identifying and naming species within the genus. In addition, scientific classification schemes differ from harvester classification schemes. The two major types of morels identified during this study fell into the harvester categories of burn morels and gray morels, both of which fruit in greatest abundance the spring or summer following a forest fire. Other morel varieties include those that are not necessarily associated with fires, including the varieties harvesters categorize as naturals and blondes. Naturals and blondes tend to grow in mixed-conifer forests with relatively open canopies or in meadows and small clearcuts. All four types of morels tend to be associated with soil disturbance and dying or damaged trees (table 4).

Morels fruit in a variety of environments, including areas that have been disturbed by fires, insect infestations, and logging operations. In the Western United

¹Gray morels fruit into early October in parts of Montana. The lead author first heard of such fruitings during 1998 while working as a mushroom buyer in Sisters, Oregon. In spring 1998, several circuit pickers who harvested at Sisters stated that they had picked gray morels in Montana and Idaho into October the previous year (i.e., fall 1997). Larry Evans, a wild mushroom buyer and an active member in the Western Montana Mycological Association for many years, reported in an email to the lead author dated March 11, 2005, that he found gray morels on September 29, 2001, on the Moose Fire near Glacier National Park. He notes in the email: "Morels found Sept 29 were in a variety of sizes and ages, suggesting that later fruitings might be developing right up to the snow."

Table 4—Commercial classification of morel varieties in western Montana, 2001

Commercial classification	Description
Burn morels	Burn, or fire, morels have a dark, almost black color, cylindrical shape, solid wall construction, and small exterior ridges on the caps. Burn morels sold commercially are often much smaller in size than the naturals, blondes, and grays.
Naturals	Naturals, also called conicas and blacks, are lighter brown in color than the burn morels, conical in shape, have deep exterior ridges, and thin double-walled construction. They tend to be less uniform in shape, are more likely to have worms, and hold up less well in storage and transport than burn morels.
Blondes	Blondes, also called golds, golden morels, yellows, and whites, have the more cylindrical shape and deep ridges of the naturals, but are beige to golden in color, and much denser than naturals.
Grays	Grays are a late-season burn morel, gray and brownish gray on the heads, becoming lighter with increasing size. Stems range from dark gray to whitish and, similar to the heads, also become lighter with increasing size. Heads have irregularly patterned pits. Pits are smaller and more firmly compressed in young individuals. A coating of small hairs covers the surface of young heads, becoming less noticeable, on older specimens. The gray morels are hollow and particularly thick and robust because of their double wall.

Source: Adapted from McLain 2000: 155.

Morel crops are often abundant in burned areas in the year immediately following a forest fire.

States, morel crops are often abundant in burned areas in the year immediately following a forest fire. Although recent studies suggest that morels can be mycorrhizal (Buscot 1992, 1993; Buscot and Kottke 1990; Dahlstrom et al. 2000), mycologists have until recently classified them as saprobes, which acquire nutrients by breaking down decayed organic matter (Ower 1982). Understanding the distinction between saprobic and mycorrhizal life strategies is critical to establishing appropriate management regimes (Pilz et al. 1999). From the picker perspective, the difference in life strategies is also important, as how morels obtain nutrients affects their distribution in space and time.

Mycologists agree that at least two distinct morel groups exist: dark morels (the Elata clade) and yellow morels (the Esculenta clade) (Pilz et al. 2004). Mycologists have identified 13 potential species of yellow morels and 9 potential species of dark morels in North America (Pilz et al. 2004). Data from morel samples gathered in 1995 from sites in northeastern Oregon suggest the likely presence of at least five distinct morel species: a natural black morel (found in unburned areas), three forms of burn morels (pink, green, and gray), and a blond morel (a light-colored type) (Pilz et al. 2004). The scientists who conducted the study, however, note that morphologically the pink and green morels, which likely correspond to the harvester category of “burn” morel, are indistinguishable from each other (Pilz et al. 2004).

Mushroom ecology is extremely difficult to monitor from season to season, particularly for species such as *Morchella* spp., which may never fruit in the same area twice. Even slight variations in temperature or precipitation can alter fruiting site and abundance (Weber 1997). The wildfires that promote morel flushes the following spring or summer create ideal habitat for commercial harvesting. It is likely that morels respond favorably to the organic acid neutralization that fires provide (Apfelbaum et al. 1984). Fire may also create an environment suitable for morel fruiting by reducing concentrations of substances that inhibit fungal growth (Duchesne and Weber 1993) and by removing litter that may inhibit ascocarp formation (Apfelbaum 1984).

Information from commercial harvesters and buyers indicates that beyond the first year following a fire, productivity declines rapidly for at least some species of postfire morels. The intensity of fire, extent of tree mortality, weather, season, and degree of soil disturbance all affect morel growth. Elevation, slope, aspect, forest vegetation composition, and snow patterns also greatly affect morel fruiting. In the dry inland montane forests of the Pacific Northwest, morels fruit in spring and summer after the snow has melted when humid weather persists (Pilz et al. 1999).

Although we know that morel spores are released from dry, mature morels, scientists do not yet know how the spores colonize. Pilz et al. (1999) suggested that spores may persist for a long time in the soil, fruiting when conditions become suitable. Alternatively, Pilz et al. (1999) suggested that spore loads remain in the atmosphere, colonizing an area annually. If morel colonization does depend on annual spore dispersal, taking large portions of individuals could potentially cause future fruiting to decline. However, without knowing how a colony becomes established, how morels breed, how genetically diverse they are, and more about population dynamics, it is difficult to suggest management regimes for morels (Pilz et al. 1999).

Morels occur on the landscape in discontinuous concentrations, known by pickers as “patches,” which typically fruit in a series of flushes (McLain 2000). Although it is difficult to predict exactly which patches will fruit and when a flush will start, pickers and buyers who have worked an area for many years possess highly detailed mental maps of patch locations and a highly developed understanding for the combination of climatic, soil moisture, and vegetation conditions that indicate that patches in a given area are likely to begin or continue fruiting (McLain 2000).

Study Results

Scope of the Commercial Morel Harvest in 2001

Seven national forests in Region 1—Beaverhead-Deerlodge, Bitterroot, Clearwater, Helena, Kootenai, Lewis and Clark, and Lolo—issued mushroom permits during

spring and summer 2001. Commercial pickers had to obtain forest-specific permits for each of the national forests. For example, a permit issued by the Bitterroot could not be used for picking wild mushrooms on the Lolo or Kootenai. The national forests offered 7-day, 14-day, 30-day, and seasonal permits for commercial harvesting, at a cost of \$20, \$40, \$60, and \$100, respectively (DeWolf 2001). The national forests also offered pickers the option of obtaining a personal-use permit if they wished to harvest only small quantities of mushrooms (1 to 3 gallons, depending on the forest) for their own use or for noncash exchange. The forests issued personal-use permits free of charge (DeWolf 2001).

The permit data for the 2001 season provide an estimate of how many pickers may have participated in the harvest (table 5). The seven forests issued 3,642 commercial and 3,750 personal-use mushroom permits between May and August 2001, a total of 7,392 permits (DeWolf 2001). This figure represents only a rough approximation of the number of pickers partly because some pickers obtain several less-expensive short-term permits rather than one seasonal permit. McLain's (2000) study of wild morel pickers in central Oregon also suggests that some pickers obtain multiple short-term permits. Consequently, the number of pickers obtaining permits likely was somewhat lower than the number of permits issued. Second, it is also possible that a picker obtained both a commercial permit and a personal-use permit during the season. Third, it is likely that some pickers obtained permits for several forests.

Table 5—Morel permit activity in the Northern Region, May–August 2001

National Forest	Number of commercial permits issued				
	May	June	July	August	Total
Beaverhead-Deerlodge	0	125	247	71	443
Bitterroot	322	997	57	22	1,398
Idaho Panhandle	0	0	0	0	0
Clearwater	0	0	18	-	18
Custer	0	0	0	0	0
Flathead	0	0	0	0	0
Gallatin	0	0	0	0	0
Helena	0	27	4	0	31
Kootenai	229	437	65	4	735
Lewis and Clark	0	0	0	1	1
Lolo	824	150	28	14	1,016
Nez Perce	0	0	0	0	0
Northern Region total	1,375	1,736	419	112	3,642

Source: DeWolf 2001.

Offsetting the tendency of the permit tracking system to overestimate the number of pickers is the likelihood that many pickers harvested mushrooms without obtaining permits. A reasonable estimate of the number of commercial pickers is thus likely somewhere between 3,000 and 4,000. The authors' cumulative experience of more than 30 years of participating in wild mushroom harvesting indicates that many personal-use pickers do not obtain permits. The number of personal-use pickers was thus probably at least 3,750 (the number of personal-use permits issued by Region 1 forests) and likely much more.

In addition to providing a rough idea of the number of pickers harvesting in the region during 2001, the permit data also offer some indication of the spatial and temporal distribution pattern of pickers over the season. Table 5 shows the Lolo National Forest issued the most permits in May. In June, however, the Bitterroot National Forest issued far more permits than either the Lolo or the Kootenai. In July, all three forests experienced a sharp decline in the number of permits purchased. However, demand for permits remained higher on the Kootenai and Bitterroot than on the Lolo. At the same time, the number of permits requested from the Beaverhead-Deerlodge National Forest (located to the south and east of the Bitterroot Valley) nearly doubled from June. The demand for permits declined further on all four forests in August, and no one requested permits in September.

Assuming that many of the pickers harvested on multiple sites, the picture of the 2001 harvest depicted by the permit statistics is as follows: Pickers started harvesting on the Lolo and Kootenai in May, both of which had a large percentage of burns at elevations lower than those on the Bitterroot. In June as the higher elevation burns on the Bitterroot and Kootenai began to produce morels, pickers on the Lolo moved into those areas. In July, a few hundred pickers working on Lolo, Kootenai, and Bitterroot moved east into the Beaverhead-Deerlodge National Forest. Of these, perhaps 25 percent remained in the Beaverhead-Deerlodge area through August before heading home, in Montana or elsewhere, or west to pick fall mushrooms. The Kootenai National Forest's special forest products coordinator indicated that a few harvesters continued to harvest gray morels until late August.

Field Buying Stations: Social Interactions and Operator Strategies

During early June 2001, 10 wild mushroom buying stations operated in or near the town of Darby adjacent to the Bitterroot National Forest (fig. 3). The actual number of buying stations, however, was likely much greater. The field researcher talked with operators of three stations, including two stations run by Caucasian buyers and one station managed by a team of two Caucasian and one Southeast Asian buyers.



Figure 3—During the 2001 season, most morel buyers in western Montana set up temporary buying stations near settlements close to the major picking sites in the Bitterroot, Lolo, and Kootenai National Forests. Hand-painted signs, such as the one depicted here, inform pickers that a buyer is operating in the area.

The special forest products coordinator for the Kootenai National Forest reported having had contact with 20 buyers in the Kootenai area. Owing to the distance between stations, the field researcher could talk with and observe only one buyer working near the Kootenai National Forest, a Caucasian woman who also coordinated buying at two other stations in the Kootenai Valley. Individuals working for at least two other companies also had set up buying stations at the time of the field work. In the following description, names of pickers and buyers have been coded to protect their anonymity.

Buying station 1—

B1 operated his station in Darby with limited help from others. He also did the work of refrigerating, drying, and shipping the mushrooms he bought as well as the mushrooms that his satellite buyer (buying station 3) purchased. B1 obtained funds for buying from the same company that financed buying station 4 in the Kootenai. He shipped fresh morels to the parent company's processing and distributing center in Seattle, Washington, and the dried morels to his company's facilities in Portland, Oregon.

B1 had worked as a wild mushroom buyer for 10 years. His station consisted of an enclosed rental building next to the main highway through the Bitterroot

Valley about a mile south of Darby and a 10-minute drive from his home. He and his wife started in the business as pickers during the late 1980s at a time when B1 was making a living as a roofer in the Bitterroot Valley. Beginning in 1990, they began buying morels in spring and summer, and then picked and graded matsutake mushrooms in central Oregon during fall. Over time, B1 became involved in the mushroom business nearly year-round, purchasing morels in spring and summer, and matsutake in fall. B1 commented that although he enjoyed making a living in the mushroom industry, at times he has considered shifting into work that is more stable.

B1 bought morels from pickers of all ethnic backgrounds. He noted that many pickers returned year after year to sell their morels exclusively to him. Some of the regular pickers stayed with his family while in the Darby area. As indicated by the following field note excerpt, B1 not only welcomed Southeast Asian pickers to his station but also had traveled and worked with groups of Southeast Asians in the past.

B1 has also gone beargrass hunting with Asian friends when he was in financial debt (7 years ago). The work was very difficult—the grass cut into their hands and the work was labor intensive—BUT it saved them in a time of need and they are thankful to their friends—one couple in particular who showed them how to do the work [Field notes from observations of buying station 1].

In June 2001, B1's station had a warm and friendly atmosphere where many pickers congregated and conversed well into the night. He offered refreshments and drinks to all pickers, as well as price incentives to a few pickers based on the quality and quantity of mushrooms they harvested. With the exception of the few pickers to whom he openly paid a higher price, his prices stayed fairly consistent.

B1 reported purchasing about 1,000 pounds per day during the first 2 weeks in June (table 6). He noted that this amount is relatively small when compared to the estimates of 5,000 to 7,000 pounds per day that buyers in the Lolo National Forest were reportedly bringing in at the same time.

Buying station 2—

The buyers running the second buying station in Darby adopted a very different approach from B1. They had set up their buying station off the highway at a spot about a mile south of B1's station, which the landowner let them occupy free of charge. They initially set up their buying station in Eureka, near the Kootenai National Forest, but shifted to Darby when the first flush of morels came on in the Bitterroot Valley.

Table 6—Examples of buyer morel purchases and drying in western Montana, 2001

Buying station	Estimated number of pounds purchased per day in early June 2001	Dries own morels
1	1,000	Yes
2	3,000	No
3	800	No
4	3,000	No

Three women—B2a, B2b, and B2c—ran the station. B2a and B2b lived in a town near Eugene, Oregon; B2c lived in a town in northern California. All three women at buying station two stated that they were full-time mushroom buyers, traveling the wild mushroom circuits in the Western United States. They bought and picked all types of mushrooms, beginning with morels in California in early spring followed by morels in Oregon, Montana, and Idaho in late spring and early summer. They then would go to Canada in August to buy matsutakes, moving down to central and southern Oregon when the matsutake harvest began in those locations. During January and February they bought winter mushrooms, such as chanterelles (*Cantharellus* spp.), lobsters (*Hypomyces lactifluorum*), yellowfoot (*Cantharellus infundibuliformis*), chicken of the woods (*Laetiporus sulphureus*), fried chicken (*Lyophyllum decastes*) and boletes (*Boletus* spp.) in southwestern Oregon.

B2a started out in the mushroom business as a packer. She later became a buyer and had been buying wild mushrooms year-round for 3 years at the time of the field work. B2b had bought mushrooms for the previous 10 years. B2c had bought and picked wild mushrooms for 4 years.

In addition to buying mushrooms, B2c also worked seasonally as a translator on contract with the Forest Service to help agency managers communicate with Laotian and Cambodian pickers. B2c started working as a translator in the late 1990s, when a national forest in the Pacific Northwest hired her as part of an effort to decrease tensions between pickers and Forest Service employees. The summer of 2001 was the first year that the Forest Service had hired her to work during the morel season and in Montana.

Unlike B1, who bought out of the same location every day, B2a, B2b, and B2c stated that they rarely set up their station in the same place twice. In deciding where to set up their station for the night, they look for the area with the busiest harvester traffic. Their station consisted of several collapsible tables, several plastic mushroom baskets, as well as scales. They neither refrigerated nor dried their own morels, activities that took place at their buying company's field headquarters whose

location they were unwilling to divulge. They did not offer refreshments, and although they paid some pickers higher prices, they did not do so openly.

During the time the field researcher observed buying station 2, nearly all the pickers frequenting the station were Southeast Asians. The presence of a Southeast Asian buyer, who also worked as a translator for the Forest Service, appeared to play a role in the ability of buying station 2 to attract Southeast Asian customers as described in field notes:

[Buying station 3] does not have nearly as many customers as the buyers next door to them [i.e., buying station 2] have. Since B2c is a translator and speaks many different Asian languages, harvesters who pull into the driveway (that both buyers are set up in) B2c often approaches first, speaking their language and winning their business.

The three women running buying station 2 stated that they purchased an average of 3,000 pounds per day, considerably more morels than the other two buying stations the field researcher visited in Darby at the same point in the 2001 season. They ran an extremely fast-paced, somewhat impersonal business, buying the greatest volume in the least amount of time. The prices they offered pickers were consistently lower than the prices other nearby buying stations offered. For example, when nearby buying stations offered \$3.25 or \$3.50 per pound for field run morels, the operators of buying station 2 offered only \$3.00 per pound.²

Buying station 3—

B3a and B3b, a couple from Oregon, operated a buying station that exemplified yet a third approach to morel buying in the Bitterroot Valley during the 2001 season. Before 2001, the couple had bought morels as independent buyers for several years. This was the first season that they worked as field buyers for B1. They contracted to give B1 a percentage of their earnings in exchange for use of his refrigerated storage

²The study data do not permit us to determine precisely why buy station 2 was able to capture a greater volume of mushrooms despite offering a slightly lower price than the neighboring buy stations 1 and 3. However, based on one co-author's experience as a wild mushroom field buyer, two possible explanations include (1) If one buy station is noticeably faster than a neighboring buy station at purchasing mushrooms, pickers will sometimes opt to sell their product at a slightly lower price to the faster buyer. As buy station 2 had three buyers, compared to one at buy station 1 and two at buy station 3, it is probable that pickers going through buy station 2 would have had less of a wait. (2) Buyers vary in the degree to which they impose quality control standards on pickers. A picker may be willing to accept a slightly lower price from a buyer who she thinks will do an easier "grade." In this way, the picker may end up making the same or slightly more than she might have if she had sold to a buyer imposing stricter grade standards. In addition, some Southeast Asian pickers may have felt obliged to sell their morels to buying station 2 as they had benefited from the services of the translator who served as one of the three buyers for the station.

area and drying equipment as well as his expertise. Relative newcomers to the field of morel buying, they bought many fewer pounds per day (an average of 800 pounds) than the three other buyers. Their relationship with B1 was that of co-equals: they worked for B1 during the morel season, and B1 worked for them during the matsutake season in Oregon.

B3a and B3b observed that they make most of their money during the matsutake season, when they coordinate the operations of several field buying stations near Crescent Lake, Oregon. Although relatively inexperienced in the morel industry, they had considerable experience in the wild mushroom industry, having worked as buyers and field coordinators in the matsutake business for 10 years. They ran the station as a family operation, with their son and B3a's father assisting with weighing, sorting, and packing morels.

B3a and B3b had set up their station very close to buying station 2, perhaps as a way to encourage some of the pickers frequenting the women's station to sell to them instead. They purchased from pickers of a variety of ethnic groups. Like B1, they offered refreshments to all comers, and openly paid certain pickers higher prices. Although their station was a less solidly constructed structure than B1's, it was more elaborately constructed than buying station 2. Their buying stand resembled a seasonal farm stand, with an awning to protect the buyers and pickers from the sun and rain.

B3a and B3b noted that their goal as buyers was to get as many pickers as they could into their station and to then offer the picker a good enough deal that he or she would sell to them. They were less concerned with the number of pounds they purchased each day than were the other buyers. The field researcher noted a strong sense of competition between the operators of buying station 2 and buying station 3, which purchased mushrooms for rival companies. Unlike B1, B2a, B2b, and B2c, who stated that they intended to remain in the morel buying business, B3a and B3b expressed ambivalence about their long-term future in the morel industry. They noted that they considered matsutake buying their main enterprise and morels as a secondary undertaking. The following field note observation about B3a and B3b illustrates the couple's approach to their involvement in the morel industry:

This is the fourth night of selling and the 1,000 pounds they bought tonight is the best that they have done yet. They are happy with this and tell me that this is really a side business and they are not competing for the big money.

During the times of the year when they are not buying morels or matsutake, B3a and B3b stated that they spent their time fishing and traveling. They observed

that they liked the seasonality of the work, which gives them an opportunity to engage in other activities besides work.

Buying station 4—

B4, who grew up working in the wild mushroom industry, ran a very different operation from the three buying stations described in the Bitterroot. B4's father became a wild mushroom buyer in the 1980s, at a time when the wild mushroom industry in the Western United States was starting to expand. As a child, B4 traveled with her father as he followed the wild mushroom circuits. She noted that, having grown up in the industry, she never considered doing anything else.

Although a resident of Libby, B4 stayed in town only long enough to buy during the peak morel season. B4 coordinated three buying stations: one near the town of Libby, another near the town of Troy, and the third in the Yaak Valley, north of Troy. She operated one of the stations herself—the station near Libby—with the help of a buying partner. She obtained buying funds to run the three stations from a large company based in Portland, Oregon. B4's station was located along the main highway through the Kootenai Valley. However, she stated that she changed its location during the season depending on where most pickers were concentrated. Sometimes she “tailgated,” meeting pickers along the road as they came out of the woods, thus saving them a trip into town.

B4 worked for the same company as B1, the operator of buying station 1 in the Bitterroot Valley. However, her station more closely resembled buying station 2, in that it consisted of a foldout table or two, some mushroom baskets and a scale set up outside a gas station. She offered no refreshments to pickers. Although she occasionally paid some pickers higher prices, she did not do so openly.

The gas station manager provided B4 with access to refrigerated storage for the morels she bought. She shipped the fresh market morels to Seattle, where her parent company then distributed them to customers in the domestic or international market. B4 sent dried morels to their parent company's processing and distribution facility in Portland. However, unlike B1, her counterpart for the company in the Bitterroot Valley, B4 was too busy to dry morels purchased through the three stations she coordinates. She thus contracted out the drying operations under the conditions described in the following excerpt from the field notes:

B4 hires people to dry mushrooms for them [herself and her buying partners] because they are too busy to buy as well as dry. So, they cart their fresh mushrooms down to the drying machines each night and split the price. In other words, B4 gets 50 cents and the people who work the dryers get 50 cents per pound.

In sharp contrast to B1, whose station was frequented by pickers of many ethnic backgrounds, B4's picker clientele consisted almost exclusively of local Caucasian pickers. According to B4, the mobile Southeast Asian and Hispanic pickers harvesting in the area sold their mushrooms to a station in town operated by a field buyer working for a different company.

During the early part of the 2001 season, B4 brought in roughly 3,000 pounds of morels per day from the three buying stations she coordinated, an average of 1,000 pounds per day per station. Her average daily purchase per station was thus comparable to the amounts B1 purchased in Darby at the same point in the season. B4 noted, however, that any time she bought over 500 pounds per night, in her view it was a good night (fig. 4).



Figure 4—In the woods, most pickers carry 5-gallon plastic buckets for transporting morels. At the end of the day, pickers transfer their harvest to a standard-sized plastic basket, which buyers also use for shipping. Each basket holds 15 to 20 pounds of morels. During the early part of the 2001 season, the eight baskets of morels depicted here likely would have had a total value of about \$360.

In a followup phone conversation at the end of the season, B4 estimated that her three stations had purchased \$300,000 worth of morels from a predominantly local group of morel pickers. Of this, she paid out more than half (\$154,000) between May 5th and June 5th. She reported purchasing 60,000 pounds of morels from the three stations near the Kootenai National Forest between the beginning of May and the end of July 2001.

Unlike the operators of the Darby buying stations who intended to buy morels all summer, B4 shifted into picking and buying huckleberries (*Vaccinium* L. spp.) once they ripened. However, like the three buying groups in Darby, she planned to spend September and October buying matsutake mushrooms in central Oregon.

Strategies Buyers Use to Attract Pickers to Their Buying Stations

The buyers described above used a variety of strategies to encourage pickers to sell their morels to them. Key strategies included the use of bonuses and grading systems, providing gifts to regular clients, serving refreshments to all pickers, creating space for pickers to socialize with each other and the buyers, serving as a liaison between pickers and the Forest Service, positioning stations strategically to entice pickers frequenting other buying stations, and sacrificing part or all of the buying commission to increase the price paid to the picker.

Bonusing—

All four buying groups practiced “bonusing,” i.e., offering some pickers a higher price than that advertised openly by the station. Two of the buyers engaged quite openly in bonusing, whereas the other two only provided bonuses discreetly.³ Buyers varied the prices they paid pickers depending on how well they knew the picker, whether the picker had a history of selling to them regularly, the quality of product a picker typically brought into the station, and the amounts that a picker brought in on a regular basis.⁴

Grading—

Some buyers used a grading system, in which they offered higher prices for certain types of morels, as a means to encourage pickers to bring in certain varieties of morels or higher quality products. In early June, most buyers in Darby were still buying unsorted morels, known as “field run.” However, B3b was offering higher prices for gray morels, thus encouraging pickers to sort their grays from their other morels. In addition to acquiring more gray morels by using this tactic, he also hoped to entice pickers wishing to get the higher price for grays to also sell their other morels to him.

³The study data do not permit us to assess why two of the buyers openly engage in bonusing, whereas the other two engaged much more discreetly in bonusing. However, bonusing appeared to be particularly effective when the picker felt he was getting a special deal. Because bonusing was not offered to every customer, keeping it discreet was likely intended to reduce conflict among pickers and between pickers and buyers.

⁴The study data do not permit us to evaluate picker response to differential bonusing.

A buying station serves as a space in which pickers socialize with the buyer, and potentially with other pickers.

Refreshments and gifts—

Operators of two of the buying stations, B1 and B3a and B3b in Darby, offered refreshments, such as sodas, beer, or hot coffee, to attract pickers. Additionally B1 also offered small material incentives, such as cases of soda, to encourage picker loyalty. All the stations in the Bitterroot differed from the station in Libby in that they catered to a variety of people—outsiders as well as locals.

Socializing space—

As the key point of contact between pickers and buyers, every buying station serves to some extent as a space in which pickers socialize with the buyer, and potentially with other pickers. Some buyers, however, set their stations up in ways that actively encourage extensive socializing among pickers. Conversations at buying stations covered a wide range of topics, but often centered on comparisons of how much pickers had picked that day, areas that pickers intended to check out the following day, speculations about where the next flush or hotspot would be, and stories of picking experiences during previous years.

Of the four buying stations included in this study, B1's illustrated best the concept of buying stations as points of social interaction. The circle of pickers who hung out at his station talking late into the night functioned as a mechanism for attracting other pickers, many of whom wished to find out what was happening around the forest or share stories of their day's events. As indicated by field notes of buying station 1, B1's policy of offering refreshments to all comers served to encourage pickers to hang around his station: "The mood at the buying station is spirited and warm: There is lots of hot coffee and sodas in a cooler for pickers to help themselves to."

Access to Forest Service information and translating services—

During the 2001 season, B2c's work as a translator for the Forest Service gave buying station 2 a potential advantage over the other stations. The Forest Service provided B2c access to maps of areas affected by fires in 2000, as well as updates on where the various camps and groups were situated throughout the forest. B2c thus could provide pickers with maps and information that other buyers could not obtain so readily. B2c also served the Asian pickers by helping them to communicate with Forest Service employees. The following excerpts from the field notes indicate that some pickers and buyers considered B2c's dual role a conflict of interest:

There have been several people commenting on the fact that many Asians feel obliged to sell to B2c, thinking that they owe her some loyalty for helping them set up their camps, etc. Many people feel that the FS hiring a

buyer to help with pickers creates a conflict of interest and that it is not right that B2c gets paid to promote her own buying.

Without additional data, it remains unclear whether B2c's position as a translator affected whether Southeast Asian pickers sold their morels at buying station 2.

Strategic positioning of buying stations—

B3a and B3b's operation illustrated another tactic buyers use to attract pickers—the placement of a buying station very close to a station with a reputation for attracting a large number of pickers. The buyers moving in adjacent to a station already operating hope that pickers impatient with waiting for their turn to sell their morels will opt instead to sell to the buyer with fewer customers.

Trading commissions for volume—

In 2001, the standard commission for a buyer was \$0.50 for every pound of morels purchased. Sometimes a buyer, such as B2b operating buying station 2, sacrificed a portion of her commission to increase the price she paid to pickers when her boss would not let her raise the price to the level of competitors. This strategy enabled the buyer to bring in more volume. Although using this strategy meant that B2b made less per pound, the extra volume brought in resulted in her earning the same or more money per night than if the commission had been lower and the volume less.

Changes in Supply and Prices

Six groups of buyers, one mushroom drier contractor based near the southern end of the Kootenai Valley, and two harvesters contributed information about the changes that take place in the morel market over a season. According to the buyers, most of a buyer's daily purchase early in the season goes to supply fresh-market customers. As the quantity of morels increases, the fresh market becomes saturated and many buyers shift into buying morels primarily for the drier market. Later in the season, when the supply of morels tapers off and gray morels begin to fruit, buyers shift again into buying for the fresh market.

The pickers and buyers commented that prices paid to pickers typically fluctuate greatly over the course of a season, and at times, over the course of a week or an evening. The price for fresh morels from Montana began at around \$8 to \$10 per pound at the start of the 2001 morel season in early May, but dropped to less than \$4.50 a pound after about 2 weeks as the supply of morels became more plentiful. In early June, the buyers paid between \$2.75 and \$3.25 for field run morels. Owing to the freshness of the mushrooms coming in to the stations, none of the buyers at the field sites had established different prices for driers and fresh market morels at

the time of the fieldwork. Followup calls with a mushroom drier and the operator of buying station 2 in September 2001 indicated that the price for field run morels stayed at \$2.75 and above through the summer.

The key informants commented that morel prices in 2001 were significantly higher than during the previous 5 years. They also observed that the morels harvested in Montana compete in a global market supplied with morels from many countries including China, India, Turkey, Canada, and Russia. Key informants reported that Europe constituted the biggest market for their product, although some morels were also sold domestically. The key informants identified moisture content as an important variable affecting prices, with buyers offering lower prices for morels that had started to dry out or that had absorbed large quantities of water.

Buyers and pickers noted that the types of morels available also differ over the season, with different kinds of morels commanding different prices. For example, gray morels fruit more abundantly late in the season in higher elevation areas. The high-elevation, late-season gray morels hold up better in transport and command a higher price on the fresh retail market than other morel varieties harvested in western Montana. Consequently, as indicated in the field note excerpt below, toward the end of the morel season, buyers pay a higher price for fresh-market-quality gray morels relative to other morel varieties:

So far in the season, grays are not being sorted from conicas—but once there are more, buyers will start sorting and grays will be sold for more money. Grays are heavier, have choice flavor and they are generally favored.

The four buyers constantly adjusted prices, making nightly, or even more frequent, calls to their parent companies or field managers to find out what prices they should offer. During the 7 days the field researcher observed buying stations at the two field sites, prices quoted by buyers for field run morels (i.e., unsorted by quality) varied from \$3 per pound (June 10th at buying station 2) to \$4.25 per pound (June 8th at buying station 1). Field buyers have limited control over the prices they can offer. As indicated by the field note observation below, fluctuating prices, as well as price differences among adjacent buyers, can place the field buyers in a difficult position with respect to pickers:

Today (June 8) the price is \$3.25 and that is down from yesterday's \$4.25. B1 is embarrassed to tell his customers how poor the price is. Everyone is disappointed with the low price—especially B1, but his boss won't let him budge.

The relatively high price for morels at the buying station, combined with a large morel crop, led some buyers who normally bought all season to stop their buying activities earlier than usual as storage space in brokerage operations became scarce. One buyer noted that 2001 was the first year that he had encountered difficulties in locating brokers willing to buy dried morels. The oversupply of dried morels relative to market demand was reflected in the price, which buyers reported was about \$30 per pound (wholesale, dry weight) in June 2001 compared to \$50 to \$70 per pound (wholesale, dry weight) in 2000.

Degree of Involvement in the Industry and Livelihood Strategies

Buyers—

The seven individuals who made up the four buying groups shared in common a long history and near full-time involvement in the wild mushroom industry (table 1). The buyers had an average of nearly 9 years of experience each, ranging from 3 years to 14 years. In each buying group, at least one individual had 10 or more years of experience in the wild mushroom business.

Although two of the buyers had stations located in towns they called “home,” all seven individuals spent several months each year away from home to buy wild mushrooms. Nonetheless, the buyers differed in their mobility strategy with some (B1, B3a, B3b, and B4) limiting their participation to the morel and matsutake harvests, primarily in Oregon, Idaho, and Montana, whereas others (B2a, B2b, and B2c) followed a year-long mushroom circuit encompassing a range of mushroom species and bioregions, including northern California, all of Oregon, parts of British Columbia and Washington, and the northern Rockies.

Mushroom buying constituted the primary income-generating activity of all seven individuals in the four buying groups. Only two of the buyers (B1 and B4) supplemented their buying income through other activities. B1 and B4 were also the only buyers who mentioned gathering or buying other nontimber forest products as important in their lives: B4 gathered and sold huckleberries and B1 spent one season harvesting beargrass (*Xerophyllum tenax* (Pursh) Nutt.). In addition, B4 collected antlers to make into jewelry, lamps, and dream catchers for sale.

Pickers—

The field researcher obtained information from four pickers, all Caucasian men, at the field site in the Kootenai (table 2). Three of the pickers lived nearby, and one, a friend of the woman running buying station 4, lived in western Oregon. Of the four pickers, only one, a local resident, had never picked mushrooms before. The other

three pickers had all picked mushrooms commercially for several years, and two of the four pickers picked mushrooms other than morels (matsutake and coral) for sale. All four pickers participated in other income-generating activities. Activities listed included landscaping, seed collecting, huckleberry picking, gold panning, and jewelry making. In addition, two of the four pickers, both locals, received retirement income. Of the four pickers, three (all locals) gathered nontimber forest products other than mushrooms to supplement their incomes.

The seven pickers in Darby were all men, but ethnically more diverse than the pickers in the Kootenai; they were four Caucasians, one Cambodian, one Laotian, and one Latino (table 3). None of the pickers lived in Montana (table 3). Six of the seven pickers came from Oregon, and one came from northern California (fig. 5).



Figure 5—Many morel pickers working the burns in Montana during 2001 come from Oregon, California, and Washington. Most establish camps near burns with abundant morel fruitings. Pickers often construct large temporary structures by using plastic tarps and locally gathered poles to protect their tents and gear from the rain and wind.

All seven harvested fall mushrooms commercially, and five of the seven got started in the mushroom industry by picking matsutake in Oregon. All seven pickers had picked mushrooms commercially in previous years, although 2001 was the first year that two of the pickers had picked morels. Only one picker said he received retirement or disability payments. However, five of the other pickers participated in

income-generating activities outside the mushroom industry. Their other occupations included woodworking, cone collecting, floral greens collecting, professional music, and construction. Two of the seven pickers also harvested nontimber forest products other than mushrooms.

Livelihood choices—

Many people involved with the commercial wild morel industry are willing to give up some degree of certainty in their work life in exchange for being able to make money doing work that they enjoy and spending time in the outdoors. The following quotes and field note excerpts illustrate this way of viewing wild mushroom work:

The difficulty of the mushroom harvesting industry is that there is never any guarantee that you will get mushrooms. And some years are just plain bad for making money, but you have to love what you are doing... (Buyer from Station 1).

Some days are great and others are crappy but that is the tradeoff for being able to spend your days outside, working for subsistence, picking enough to buy gas to get home (Picker K2).

They like the seasonality of the work, and the fact that they can enjoy other aspects of life. Some years are great (one year they built a home with the money they made buying) and other years are poor, but they still enjoy what they do (Operators of buying station 3).

[Picker B6] is happy with the lifestyle that he leads, picking mushrooms... He says that the work is "100 percent harsh" and that he works extremely hard for sometimes as little as two or three pounds of mushrooms. He will buy his permit by the week as opposed to an all-season pass. The cost of gas and food add up, he says, and sometimes at the end of the day, he has only saved up \$30. But, the work has its benefits—among them no boss; when you are tired you can sit down (Picker B6).

[For Picker B5] the best part of his lifestyle is the freedom that picking provides. He, like others, expressed how difficult it is to work in the woods, though. The most difficult part of gathering is the heavy physical labor and working in foul weather—in cold and snow (Picker B5).

Although most of the pickers and buyers we talked with expressed satisfaction with their work, as indicated by the following field note excerpt, not everyone would remain in the wild mushroom world if they had better choices:

In [buying station 3], there are two Lao people from Portland who brought in about 100 lbs of morels. They pick matsutakes as well. One of the men says that he would like to quit but that he can't because he would not be able to find any other job with his limited skills and mastery of the English language. Also, he is afraid that he will be discriminated against because of his age (around 50 something).

Discussion

Four important patterns emerged from the data: (1) significant differences in the time that various participants invested in the wild mushroom world, (2) a high degree of similarity within the picker population included in this study and important differences between the picker and buyer populations regarding livelihood strategies, (3) the existence of both competition and collaboration among and between pickers and buyers, and (4) the role of the buying station as a center for learning in the commercial mushroom world.

Most of the pickers had invested several years or more of their lives in learning how to pick wild mushrooms.

Time Investment Patterns

Most of the pickers we talked with had invested several years or more of their lives in learning how to pick wild mushrooms. We encountered three pickers for whom the 2001 season was their first year picking morels, three who had picked morels for several years, and five who had picked morels for 5 years or more. However, of those for whom 2001 was their first exposure to commercial morel picking, two had previous experience picking matsutake in Oregon. Although the sample was small, a tentative conclusion is that many of the pickers in Montana in 2001 had substantial previous experience in the wild mushroom industry. The buyers tended to have even longer histories of involvement in the mushroom business than the pickers. The buyer with the least amount of experience in the industry had worked 3 years in the business, and four of the seven buyers had worked 10 years or more in the industry.

The long experience of the pickers we talked with contrasts sharply with Richards and Creasy's findings in their study of matsutake pickers in the Siskiyou Mountains of Oregon and California during 1993 and 1994, which showed the mean number of years pickers had been involved in harvesting was 1.66 (Richards and Creasy 1996). Because most of the pickers we talked with in Montana also participated in the matsutake harvest, it may be that, over time, fewer newcomers are entering the wild mushroom business. The Richards and Creasy study, which took place in 1993-94, was conducted relatively soon after commercial wild mushroom

harvesting intensified in the late 1980s. One would thus expect to find more experienced pickers working in the wild mushroom industry by the early 2000s. Alternatively, less-experienced pickers could be less willing to travel to distant areas to pick. High levels of work satisfaction may also help explain why some pickers and buyers remain in the business for years, and sometimes, decades. For other pickers, particularly immigrants who arrived in the United States as adults, viable work options may be limited by their lack of English language skills or marketable job skills.

Livelihood Strategies

Our study suggests that wild morel pickers typically construct their livelihoods around at least two, and often more, income-generating activities. For some people, picking is a means to supplement fixed-income payments, such as disability or retirement pay. Others, however, rely primarily upon income from picking. These pickers typically participate in both the spring and fall mushroom seasons, and likely spend from 6 to 10 months of the year harvesting mushrooms. They then fill in the gaps between seasons with other activities, such as gathering other nontimber forest products, gold panning, or doing construction work.

For all practical purposes, buyers make their living from buying, selling, or processing wild mushrooms; only two of the seven supplement their incomes through other income-generating activities during seasonal gaps. This behavior contrasted sharply with the pickers we talked with, all of whom either engaged in other income-earning activities or receive disability or retirement pay. One possible explanation for this difference is that buyers, particularly those in the matsutake business, make sufficiently more money than pickers that they can afford to not work during some parts of the year. An alternative explanation is that buyers are more likely to follow the full mushroom circuit than are pickers.

Another difference in livelihood strategies between the buyers and pickers who took part in this study is that, as a group, the pickers were more likely than the buyers to earn money through participating in other nontimber forest products industries, such as floral greens or seed collection. One likely explanation is that the barriers to entry into other NTFP markets are greater for buyers than for pickers. To compete effectively in any given NTFP market (i.e., floral greens, wild mushrooms, medicinal plants, resins, oils, etc.), a buyer has to know how that product moves through a particular market, how the prices fluctuate, to whom to market products of different qualities, how to conserve the product to minimize spoilage, who the key players in the market are, and who can be trusted and who cannot. As

with any social system, it takes time for a buyer to learn the culture and to develop relationships of trust of the market(s) she operates within. In contrast to buyers, most pickers intersect only with the edges of the NTFP markets they are involved with—they typically sell their product to a field buyer who then takes on the task and risks of moving the product further along the commodity chain.

Competition and Collaboration

Another theme emerging from this exploratory study is a picture of the wild mushroom industry as simultaneously very competitive, with many points of tension and conflict, yet also very collaborative and a place where many reciprocal exchanges take place. B3a and B3b, for example, had established a mutually beneficial arrangement with B1: he helped them make money on his home turf in the Bitterroot, while they helped him make money on their home turf in the Oregon Cascades. Similar reciprocal forms of assistance also take place between buyers and pickers as exemplified by the Southeast Asian group that taught B1 how to pick beargrass at a time when he badly needed money, and by B1's willingness to share his home with them while they worked in the Bitterroot region. At the same time, tensions among buyers abound, particularly in the case of buying stations, such as buying stations 2 and 3, which are situated very close together. In hiring a buyer to work as a translator with Southeast Asian pickers, the Forest Service inadvertently contributed to the tensions among buyers. Whether true or not, the other buyers believed that B2c's position as a translator placed her in a position where she had access to materials and information of use to pickers that they did not have. In consequence, some of the buyers attributed the ability of buying station 2's operators to attract pickers despite their low prices to feelings of indebtedness on the part of pickers for the services B2c provided them.

Buying Stations as Learning Centers

The study supported Love et al. (1998) and McLain's (2000) conclusion that buying stations function as important centers for participants in the commercial wild mushroom world to produce and share knowledge of wild mushroom ecology, market conditions and behaviors, regulatory conditions, and a host of other important topics that influence their lives. However, it was also apparent from the data that some buying stations functioned better as learning centers than others. B1, for example, structured his station in a way that encouraged pickers to hang out, giving them an opportunity to learn from others as well as share information of their own. Similarly, the presence of a multilingual buyer at buying station 2, gave the station an edge as a learning center for Southeast Asian pickers.

Contrasts With Floral Greens Gatherers

The study revealed interesting differences and similarities between patterns in the organization of the wild morel mushroom world in western Montana relative to those identified by social scientists working with floral greens gatherers (Emery et al. 2002, Hansis 1998, Lynch and McLain 2003). The harvesters included in the Emery et al. (2002) study of NTFP gathering in the Eastern United States tended to rely upon the harvesting of greens and medicinal plants as an economic cushion in hard times or to supplement their incomes in good times rather than as their primary source of income. In contrast, most of the morel pickers included in this exploratory study relied upon the harvesting of wild edible mushrooms as an important source of income, with other income-generating occupations being much less central to their lives.

The Montana morel harvesting population also exhibited a much different ethnic composition than the floral greens harvesting populations on both the west and east coasts. Hansis' (1998) analysis of beargrass permits issued on the Gifford Pinchot National Forest for 1993 and 1994 indicated that Latinos obtained roughly 31 percent of beargrass permits issued in 1993 and 52 percent of beargrass permits in 1994.⁵ Lynch and McLain's (2003) study of the floral greens industry in western Washington indicated that by 2002, Latinos constituted the majority of commercial floral greens harvesters on the Olympic Peninsula. Similarly, in a study of galax (*Galax Sims*) harvesters working in the Appalachians, Emery et al. (2002: 9) noted that, "the people who gather galax appear to be shifting from dominantly Anglo-Americans to dominantly Latino immigrants." In contrast, according to the buyers and Forest Service employees included in this study, Southeast Asians of various ethnic backgrounds likely constituted the majority of wild morel pickers in western Montana in 2001. Latinos also harvest morels (McLain 2000), but thus far have yet to become as numerous (or as visible) in the mushroom industry as they have in the floral greens industry in west coast forests.

Implications for Managers and Scientists

This study has several important implications for managers and scientists.

First, the study illustrates the diversity of strategies that commercial pickers and buyers deploy to derive livelihoods that include participating in wild morel harvests. Pickers ranged from people who participated on a limited and occasional

⁵Hansis does not provide a breakdown for all ethnic groups for wild mushroom permits for 1993 and 1994. However, he notes that in 1994, 88 percent of the commercial wild mushroom permits issued went to people with Southeast Asian surnames (Hansis 1998).

Buying stations are important sites for learning.

basis to those who engaged year after year in the harvests. When developing wild morel management policies and regulations, managers thus need to take into account this diversity and recognize that their policies will affect various pickers differently, depending on the extent to which wild morels are a critical aspect of their economic livelihood.

Second, the study suggests that buying stations are important sites for learning. Additionally, information in the wild mushroom world, as in any other social realm, is power. As a result, forest managers need to recognize that sharing knowledge selectively, whether intentionally or not, affects the ability of different pickers and buyers to compete effectively in wild mushroom markets. For example, all other things being equal, pickers and buyers with ready access to information regarding the location and intensity of burns will likely make more money than the pickers and buyers who do not have access to such information or who have to make substantial extra efforts to obtain information. The tensions this study identified between the operators of the buying stations in the Bitterroot Valley indicate that by providing maps and information regarding fruiting locations to a translator who also worked as a buyer, the Forest Service inadvertently enabled one buying station to have a competitive advantage over other stations. Managers sharing knowledge of value to pickers and buyers thus might wish to structure their outreach measures so that the information is likely to reach a broad range of buying station operators and pickers.

Third, the study reveals both similarities and differences among wild morel harvesters in Montana and nontimber forest products gatherers in the Eastern United States. As the Forest Service seeks to develop and implement more robust nontimber forest products programs in response to the mandate of recent national legislation on forest botanical products, scientists and managers might consider implementing a series of ethnographic case studies of different kinds of harvesters in different parts of the United States. Such case studies would provide the data needed to encourage the development of locally appropriate policies that would address both concerns about ecological protection and concerns about maintaining sustainable rural livelihoods based in part upon gathering activities.

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Metric Equivalentents

When you know:	Multiply by:	To find:
Acres	0.405	Hectares
Inches	2.54	Centimeters
Feet	.3048	Meters
Miles	1.609	Kilometers
Square miles	2.59	Square kilometers
Pounds	.454	Kilograms
Gallons	3.78	Liters

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