

Chapter 6: LANDSCAPE TRENDS

INTRODUCTION

By looking at the past and present conditions of the landscape, we can identify ecological and economic changes. Change is inevitable. These trends can be a natural process or they can be human-caused and usually they are a combination of both. They can also have a positive or negative effect on the landscape. If the impact is positive, the trend can be encouraged and promoted. If the impact is negative, improvements may be possible. Some trends are unchangeable, and the landscape and people learn to adapt. Trend identification helps people focus on priorities for restoration work or educational opportunities. We can agree on the trends but not everyone can agree on whether the impacts are positive or negative to the ecosystem. Nevertheless, it is likely the community and individuals will want to control some of the changes.

BACKGROUND

This chapter is a composite of the trends and issues identified by various groups of people and individuals during the period of 2001 to 2002. The Landscape Committee, which worked on this document, first came up with a list of the trends they felt needed to be recognized. One of the concerns of the Landscape Committee was that all issues affecting the ecosystem were not being covered, that a certain bias might exist, and that issues might be overlooked or skewed to a certain point of view.

With this in mind, a public meeting was held at the Swan Valley Community Hall in November 2001; the entire community was invited. Categories such as social, economic, forestry, water, and recreation were listed and individuals wrote their issues or concerns under that topic. The Landscape Committee still felt that the diversity of the community might not be represented and that a wider population needed to be reached. This resulted in a questionnaire that was developed from the issues brought up at the public meeting and mailed to over 300 Swan Valley residents. Thirty percent (30%) returned their questionnaires (87 responses).

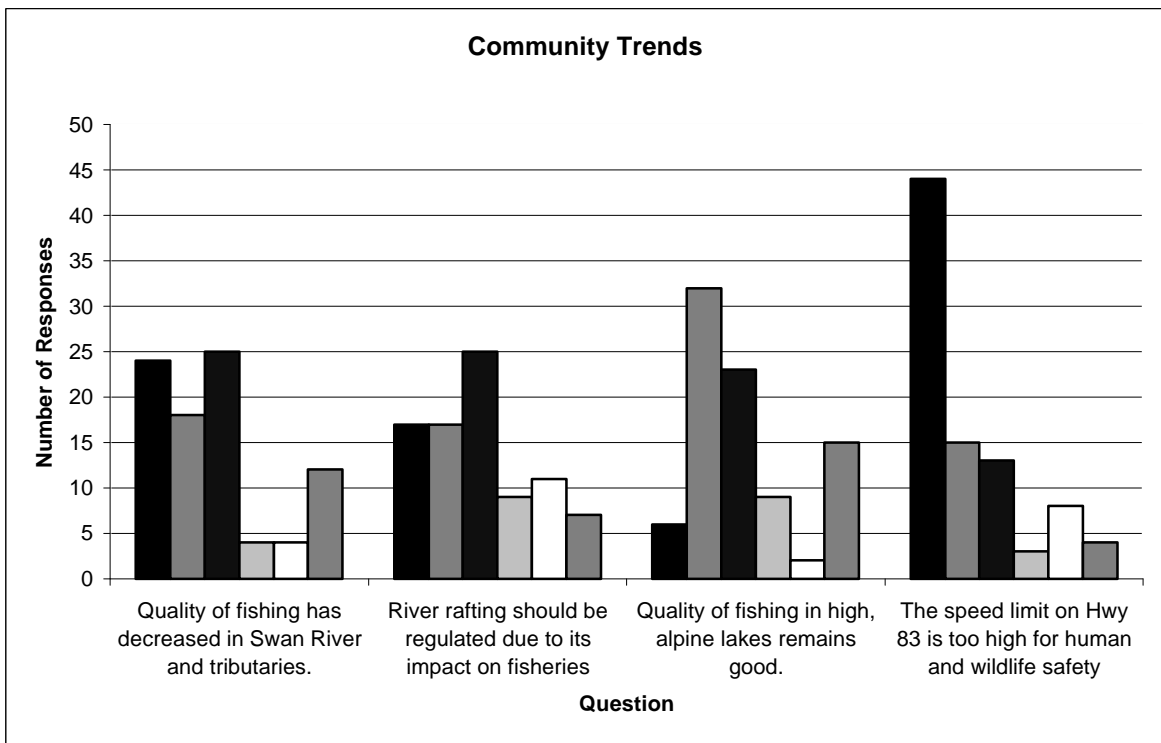
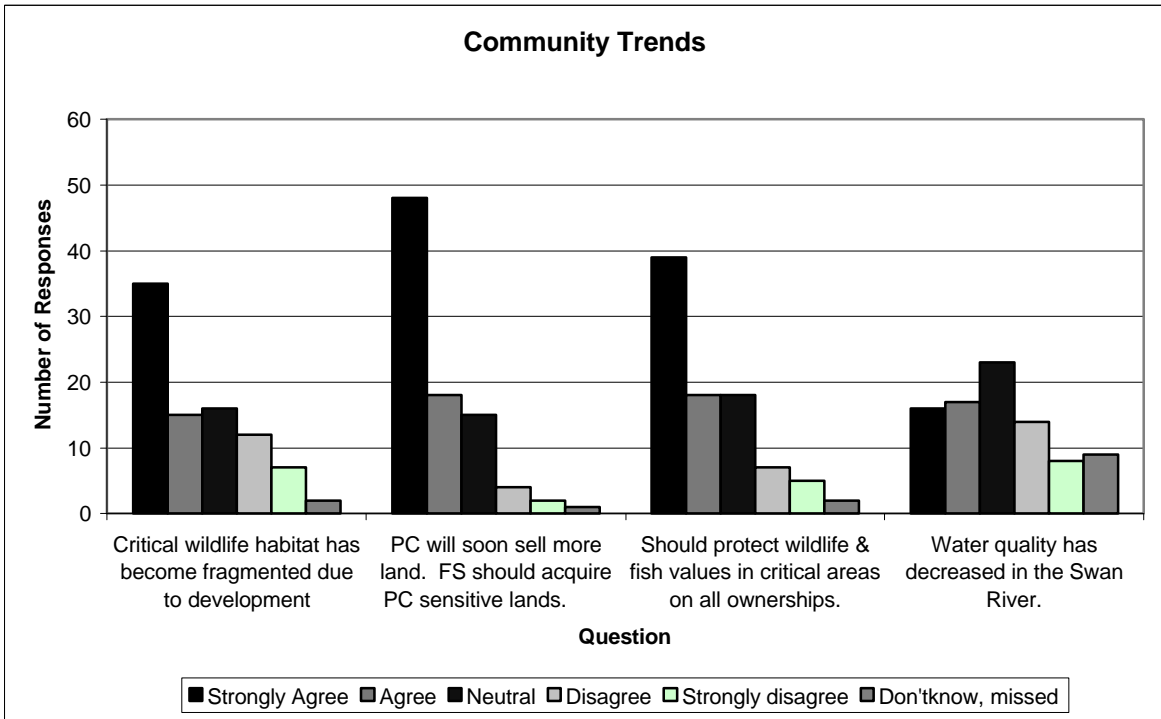
This chapter discusses trends based on the results of the questionnaire. It must be noted that these trends are representative of the time period in which they were solicited. Trends may change swiftly and often, so trends should be reviewed periodically.

Additional responses from the public meeting are added. The final portion of this chapter was contributed by the Landscape Committee which identified other topics specific to ecosystems or connectivity as described in the Landscape Assessment.

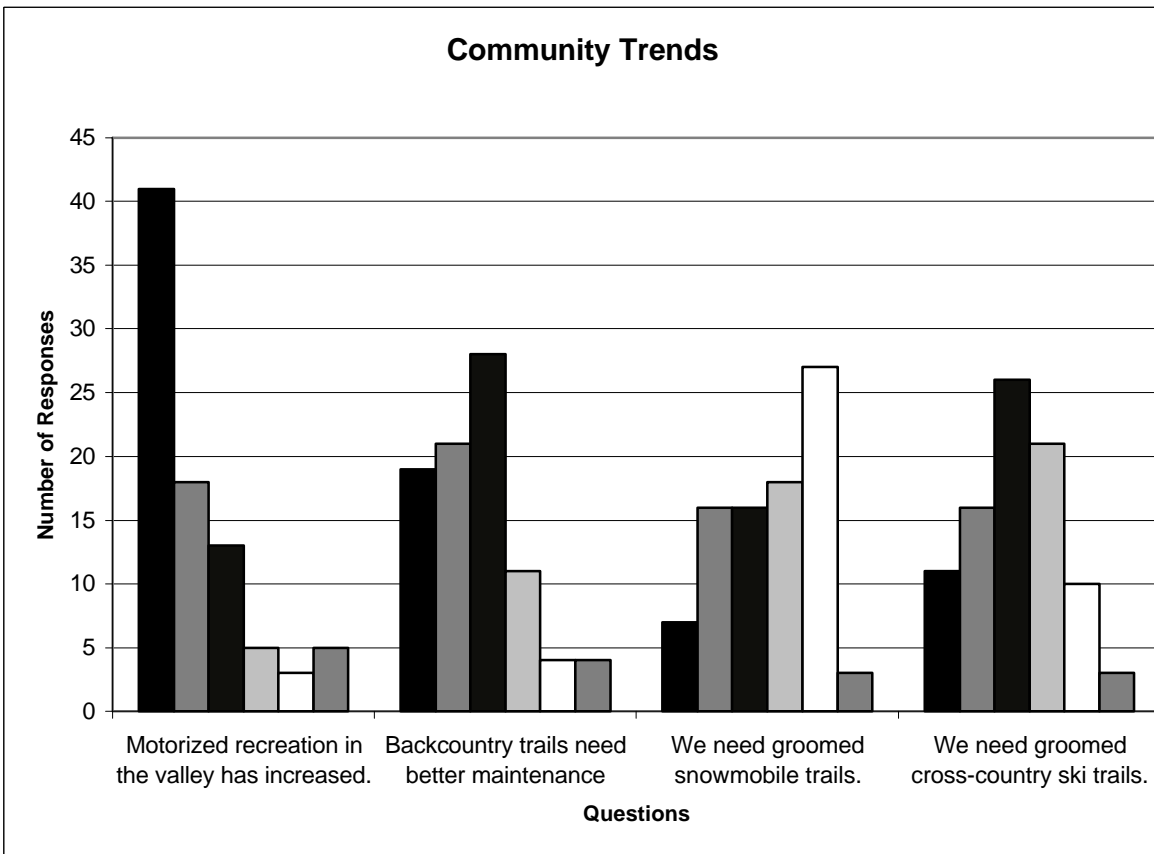
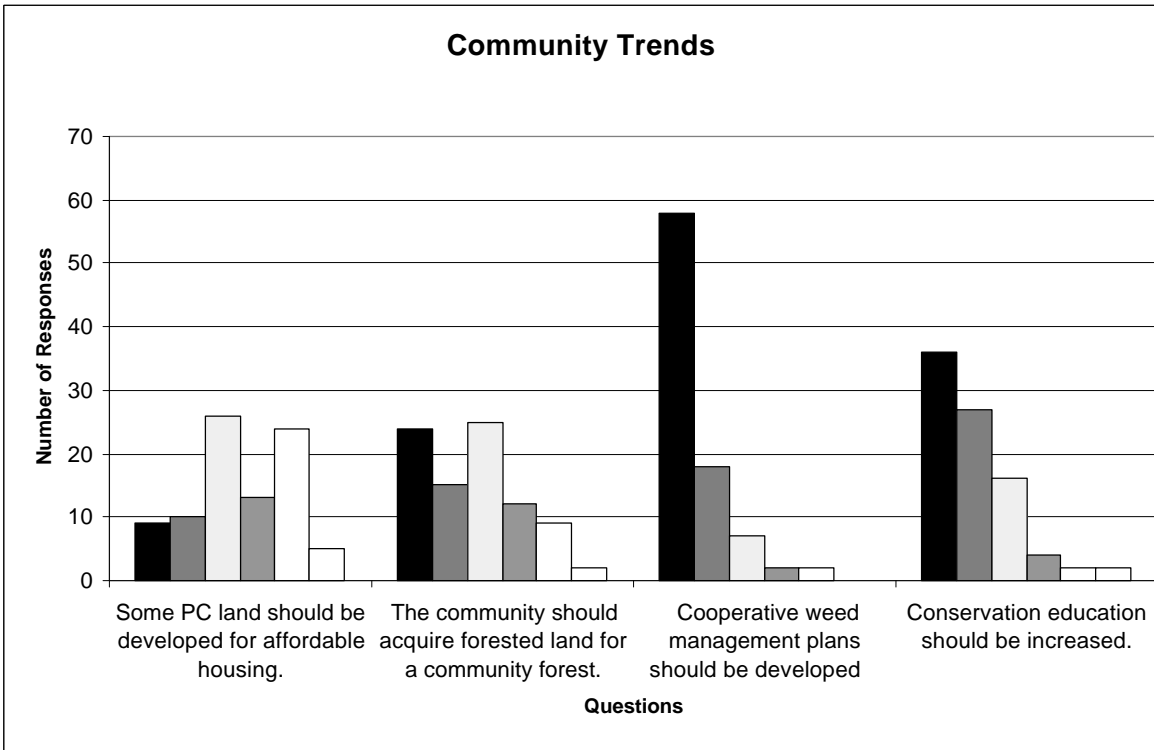
SWAN VALLEY RESIDENTS' VIEW OF TRENDS

The following charts show the responses to the questionnaire in the order they were listed. A summation by topic follows the charts.

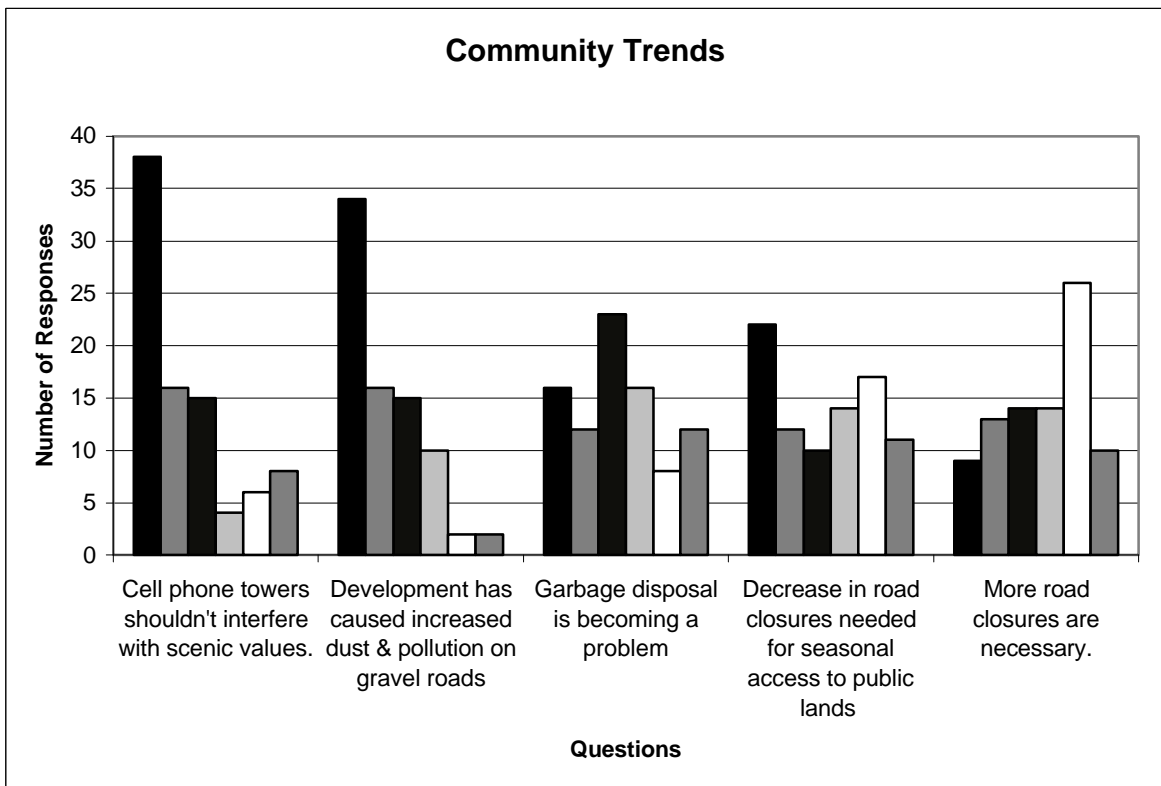
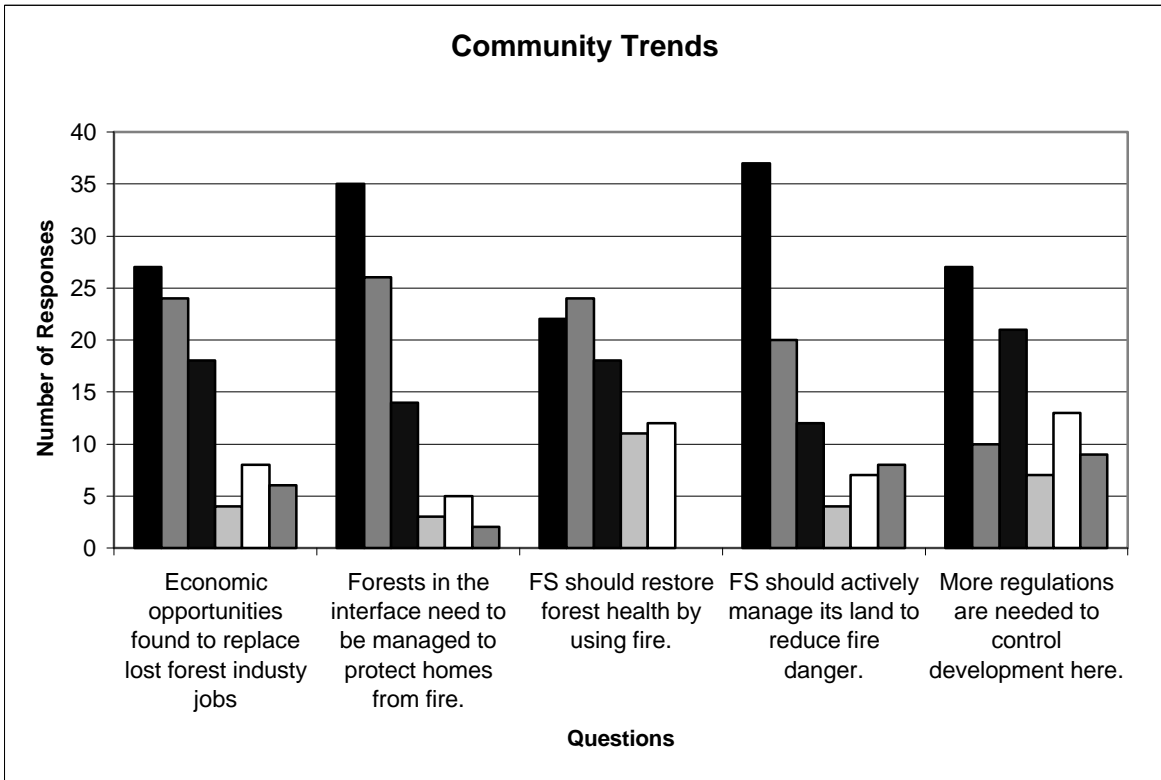
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Some persons commented on the questionnaire itself. Someone felt that “many of these questions appear loaded, leading to preconceived conclusions; included vague terminology or jargon contributing to promoting of preconceived conclusions.” Someone was concerned with how the answers were interpreted which influenced their response. Another person said, “Thanks for the opportunity to respond.”

TRENDS BY ISSUE

What follows is an interpretation of the responses with written comments included. The order is based on consensus of response, agreement or disagreement.

Noxious Weeds/Invasive Species

A large majority of the responses (87 %) strongly agreed that cooperative weed management plans should be developed to control noxious weeds. Only five percent (5%) disagreed and eight percent (8%) were neutral. Residents thought that there was an increase in noxious weeds valley-wide. Missoula County, Lake County, State of Montana, U.S. Forest Service, Plum Creek Timber Company and individual landowners need to be involved since weeds do not obey ‘no trespassing’ signs. The fact remains that one of the major vectors for transferring weed seeds is by vehicles. The spotted knapweed infestations in the Swan Valley follow along all the road systems. The U.S. Forest Service has an environmental assessment in place to manage noxious weeds. A few local neighborhood road groups have successfully worked together to obtain grants and eradicate weeds on their road system (**Appendix C**).

It appears that providing information about the identification, proliferation, and impacts of noxious weeds has been successful in the Swan Valley because of the number of people who identified it as a problem. Comments included: encourage more small local community road groups to manage the weeds on their road systems and land, and petition the counties to manage weeds on the county roads.

A concern was raised that any type of management could become mandatory, similar to the situation whereby Flathead County already has enforced weed management guidelines.

At the public meeting additional comments included: more resources need to be available to the community (i.e., how to control weeds, options for doing so, cost-effective sprayers); education needs to focus on the risks of letting weeds proliferate, and getting the young people involved in the cause. It appears weed education is working and the efforts need to continue.

Sale of Plum Creek Lands

The sale of lands owned by Plum Creek Timber Company has accelerated. When the Landscape Committee discussed this issue, Plum Creek’s prediction was to sell 2,500 acres within the next 10 years. However, as of February 2002, nine months after its initial forecast, Plum Creek Timber Company stated that 20,000 acres would be sold within five to seven years. This situation has potential for dramatic future impacts and may not be reflected accurately due to the recent revelations.

Seventy-five percent (75%) of the respondents to the questionnaire agreed the U.S. Forest Service should acquire Plum Creek Timber Company lands in sensitive

areas. Land trusts were cited as solutions. More people were neutral (17%) than people who disagreed (7%).

At the public meeting, it was pointed out that valley residents should consider how Plum Creek Timber Company sales will affect ecosystems and the community. The Swan Valley population could increase significantly causing further habitat fragmentation for wildlife plus decreased hunting and fishing opportunities for residents. Stewardship will be needed for lands that are sold. Considerable access historically enjoyed by the public could be lost.

Conservation Education _____

Seventy-two percent (72%) thought conservation education should be increased. Eighteen percent (18%) were neutral and seven percent (7%) disagreed. Comments focused on whether conservation education should concentrate on adults or start within the school system or both.

Forest Management _____

Seventy-two percent (41% strongly) of the respondents to the questionnaire agreed the U.S. Forest Service should manage their lands to protect homes in the rural interface from fire. Sixteen percent (16%) were neutral while nine percent (9%) felt the U.S. Forest Service should not manage the land for fire protection. Two-thirds of the respondents also felt the U.S. Forest Service should manage all federal lands to reduce fire danger (65%). A slight majority (53%) felt forest health could be restored with the use of fire, while 14 percent (14%) were neutral and 12 percent (12%) disagreed.

Comments were interesting. People wanted to know where this “wildland/urban interface” is and what the definition of “manage” is. Another question was, “What about owner responsibility?” Included in the responses was a comment, “Private land is private responsibility.”

Many persons said the U.S. Forest Service should restore forest health by simply working in the forest again, but fuel reduction is not the only tool in the box and many times not appropriate. Recent history shows prescribed burns may be beyond U.S. Forest Service capabilities. Someone suggested using fire after mechanical thinning/ harvesting in selective and appropriate areas.

Someone said the amount of land Plum Creek Timber Company has clearcut prevents the U.S. Forest Service from managing the public lands because of the cumulative impacts on the watershed from extensive forest removal. Another commented that catastrophic fire is not the problem. Ecosystem management is the answer. Someone felt it was not economically possible for the U.S. Forest Service to manage forestlands. Firefighters must fight fires to protect other resource values such as wildlife habitat -- not to protect private property only.

At the public meeting it was brought up that global long-term weather patterns (e.g., warming, drought) contribute to increased fire danger.

Recreation _____

Sixty-nine percent (69%) of the respondents agreed that motorized recreation use has increased. Other recreationally focused questions were less clear. Some people agreed (46%) that backcountry trails

need better maintenance, but 32 percent (32%) were neutral. It would appear that a mix of well-maintained to wilderness-type trails fits the spectrum or that the status quo is suitable. Fifty-two percent (31% strongly) opposed snowmobile trails, although 26 percent (26%) were in favor. Those focused against groomed cross-country ski trails were fairly evenly divided. As for river rafting, 39 percent (39%) agreed that rafting on the river needed to be regulated, 23 percent (23%) disagreed, 30 percent (30%) were neutral, and eight percent (8%) didn't know.

It would appear from the survey that there is no clear consensus supporting increased recreational use in the Swan Valley.

At the public meeting it was noted that there is an increase in river rafting and with that a decrease in logjams. Cited as an example are rafters (and Montana Fish, Wildlife & Parks) to the north of Piper Creek cutting the logjams out. If logjams provide better fisheries and affect water quality positively, maybe adding, not removing, logs should be considered. Someone suggested the guiding philosophy should be: "Float the river or fish the river – not float and fish."

On the lakes there is increased recreational use of jet skis causing noise and water pollution. Someone commented that "I can't help but think that it (regulation) is only a matter of time – wish I could think of a happy medium." Another person felt that recreation vehicles "are being 'picked on' again." And another wanted to know how to get vehicle users to "thin out the cost."

There are more homes and development on the lakes. Access is limited by sales of river/lake front land to private parties. For reference, consider what has

occurred at Lake Tahoe (California) and Flathead Lake, and Lake Mary Ronan (Montana). It appears the higher elevation lakes are less threatened.

Montana Highway 83_____

Sixty-seven percent (67%) thought traffic speed on the highway was too high for safety. Fifteen percent (15%) were neutral and 13 percent (13%) disagreed. Persons noted that since the speed limit is not enforced, really there is no limit. One said that it is a major problem for the area ("just count the dead deer"). Another commented that speed was "not overall a problem, but yes, in some areas."

The same concerns were expressed at the public meeting. With the higher speed limit, it appears there is increased traffic and more dead deer. Some said that we need a lower speed limit or "try reflectors."

Swan Valley residents could take action and petition the state to lower the speed limit to 60 mph or less because too many animals die, it is too noisy, and "it's too dangerous." One suggestion was a "no passing zone and speed limit by the school." That could be expanded to areas next to stores or to include the area from Barber Creek to the Condon Post Office. A suggestion was made that perhaps the valley needs more enforcement or that the community should put up more signs.

Wildlife_____

Sixty-four percent (64%) of the respondents said fish and wildlife should be protected on all lands, with 20 percent (20%) neutral and 13 percent (13%) disagreeing. Another wildlife question focused on whether habitat had become

fragmented. Fifty-seven percent (57%) agreed, but 40 percent (40%) were either neutral (18%) or disagreed (22%).

Development

Three out of five (63%) agreed that traffic has caused increased dust and pollution on gravel roads. Comments noted that Lake County has toxic-free dust control on several gravel roads. Most of the impact is due to dry weather or people driving too fast.

A majority of people (62%) were concerned with cell phone towers. Someone asked whether “a view is more important than the chance to save a life? Or assist in rescue?”

Many people (43%) disagreed that a portion of Plum Creek land should be developed for affordable housing. Slightly less than one-third (30%) were neutral. Comments included “Does the new owner’s opinion matter?” and “affordable housing needs a definition.” Others said that not all, but some affordable housing in the right location, would be good.

Whether more regulations are needed to control development was not clear. Forty-three percent (43%) agreed but 10 percent (10%) didn’t know and the remainder were split between neutral and disagreeing. Comments included, “Don’t tell me what to do with my land”; “Both counties need subdivision and building permit review process”; and “Not yet.”

At the public meeting, it was suggested that we need more conservation easements. There was also a discussion about large homes. Building these homes is a plus for local construction workers, but someone recommended regulations so that

another person’s new large home doesn’t destroy someone else’s view. Another concern was that the increased land values also increase the pressure to sell land.

As far as development planning, it was suggested that plans consider wildlife corridors and habitat.

Economics

Nearly 3 out of 5 people (59%) felt that replacements for lost forest industry jobs should be found. Someone said, “We need to cut trees again!” Another said, “We should manage national forests to replace those jobs.” Someone pointed out that opportunities should be found “as long as the character of the community remains the same.” Someone else said everyone was on their own, and another that education is always an option. One person noted that if the Swan Ecosystem Center was the “we” referenced in the survey, then the answer was strongly disagree, while someone else felt Swan Valley residents should fight for forest industry jobs.

At the public meeting it was noted that there are more retirees, fewer young people, and wealthier families moving in, which translates to a decrease in affordable housing and an increase in land values and prices. Because of increasing property taxes, there is an increase in cost-of-living. Someone commented it is inevitable that land values will increase over time, and the cost of living will rise over time. “How do we cope?” was the question.

Some persons suggested considering “affordable” housing for the future – maybe a designated area of one acre sites or grouped housing. There needs to be a “How to Live in the Swan Valley” document as suggested reading to new/incoming residents

that realtors could give out. Statistics on actual costs would be helpful in assessing demographic trends, average ages, incomes, and related information.

There are positive aspects such as an increase in awareness in schools of the importance of forest health, environmental education, and awareness of rare plant populations in wetlands. Public participation in local land management decisions, in scientific knowledge of ecosystem management, and application of these practices by companies and individuals is increasing.

Roads

Road closures are another issue about which the community is fairly evenly divided. Most people wanted no more road closures, but only an additional three percent (3%) agreed to a decrease seasonally. Quite a few people were neutral or didn't know. Someone said that it was important just to maintain the existing open roads.

Comments suggested that people can access the closed land by walking or riding a horse. Also, some respondents noted the need to monitor/maintain existing closures. Others recommended that no changes occur to the system unless reasonably necessary or to protect water quality or wildlife. And, finally, a comment was made, "No more new roads."

Garbage Disposal

Garbage disposal was an issue that was brought forward at the public meeting, but it was not identified as a serious concern in the questionnaire. One comment noted that it was "potentially a serious future problem." Another comment was that it just

cost money to fix it. The overall feeling appears to be that most people feel it is an individual's responsibility to pay the cost for proper disposal or that garbage disposal was not a community concern.

Water Quality/Fishing

Ten percent(10%) of the respondents don't know if water quality is an issue. Slightly more (38%) agreed that water quality was worsening compared to 25 percent (25%) who disagreed. The basic consensus is that more data needs to be collected regarding this issue.

Forty-eight percent (48%) felt that the quality of fishing had decreased except in high, mountain lakes. Someone wrote the comment that the quality of fishing had decreased due to Montana Fish, Wildlife, & Parks shutting down access to Lion and Goat Creek.

At the public meeting someone said that river fishing was actually recovering, while someone else said it was worse because of loss of habitat and an increase in algae and sediment. Someone said that the small streams were much worse and should be improved/restored for the "grandkids."

Future Public Meeting Agenda Items

At the public meeting it was mentioned that future Ad Hoc meetings could address two issues – cell phone towers and the speed on Montana Highway 83.

2003 FOLLOW-UP STUDY

To augment the original, previously discussed, survey conducted in 2001, a formal study was developed by a University of Montana professor in the early part of 2003 with data-gathering occurring during May and June 2003.

A summary of the study, “Swan Valley Land Use Survey: Your Views on the Future of the Swan Valley,” is available in **Appendix F**. While more analysis is planned based upon the findings, some highlights from the study are as follows:

- Environmental features (forests, wildlife, mountains, open space and wilderness) were ranked extremely high across all three survey populations (fulltime residents, seasonal residents, and non-residents);
- Environmental features ranked higher across all three populations than social-community features (knowing your neighbors, affordable housing, independent living, community, influencing change);
- Protecting natural resources, protecting private property rights, and sustainable forestry were ranked as very important across all three populations;
- All three populations rated economic development as important;
- All three groups ranked small scale tourism as important but ranked large scale tourism as not important;

- The highest level of agreement was that lands sold by Plum Creek Timber Company should be managed by a Swan Valley community-based organization;
- Local residents, the Forestry Division of the Montana Department of Natural Resources and Conservation, the U.S. Forest Service, the Swan Ecosystem Center, and the Swan Citizen’s Ad Hoc Committee received high scores for trust as land managers;

As stated, the above points are general highlights of the “Swan Valley Land Use Survey: Your Views on the Future of the Swan Valley.” While enlightening, the reader is strongly encouraged to peruse the full report in **Appendix F** to draw his/her own conclusions from the wealth of data presented.

Overall Question_____

In sum, the overall question facing the Swan Valley residents is, “What do we want the Swan Valley to be like in 10-20 years?”

LANDSCAPE COMMITTEE

Most people who live in the Swan Valley want a strong voice in decisions affecting the land and the resources it supports. A committee wrote this Landscape Assessment, believing that the people, organizations, and governments associated with the Swan Valley need to work in harmony and with respect for natural processes.

The Landscape Committee recognized noxious weeds and the sale of Plum Creek Timber Company land as two important issues that would affect all the ecosystems identified (**Chapter 2**). Other trends are specific to particular ecosystems identified in this Landscape Assessment.

In the area of forest management, U.S. Forest Service budget cuts, agency priority shifts, lawsuits and litigation have limited the amount of work accomplished on federal land. Examples of this include the loss of funding for wilderness rangers, trail maintenance, visitor contact, and road maintenance.

There are increased restrictions on forest management partly due to the general public's increased concerns about the environment and its distrust of the U.S. Forest Service. The legacy of past forest management remains a visible sign on the landscape. Even though management techniques may change, new forestry is not yet visible on the landscape. This has resulted in U.S. Forest Service projects being challenged in court.

There is a decrease in dollars for all public agencies. The U.S. Forest Service and U.S. Fish and Wildlife Service have had their budgets decrease, especially for management that does not have a net value return. State agencies must also compete for money with other state agencies.

Road closures for motorized vehicles have resulted in decreased access to some areas and have concentrated recreational use in other areas. This is a positive impact for wildlife since it reduces human contacts/conflicts and protects some of their habitat. It is a negative impact to some localized recreation sites and for some people who rely on vehicles for recreation. Proper engineering, construction, and

maintenance can reduce soil movement from road surfaces. Use of weed-free seed, integrated weed management, and road closures are other management options.

Commercial harvesting of huckleberries seems to be increasing. This has caused concern among local residents who have always picked berries in certain areas. There are also increased harvests of mushrooms, beargrass, and other special forest products. This trend may have a positive economic impact for the harvesters, but a negative impact for local residents and huckleberry-eating bears. This trend needs to be assessed to determine its impact.

Blowdown timber has accumulated during the last 10 to 12 years. This is attributed to forest canopy fragmentation and the increase in forest edge. Mature trees growing on the edge of a recent cut-over area are susceptible to wind damage since their roots are not adapted to open growing conditions. The decrease in forest management by the U.S. Forest Service in the area of small sales has resulted in more down wood being left on the ground. Another trend is an increase in forest insect damage. Much of this can be linked back to the increased accumulation of blowdown.

Researchers say global warming, a trend of concern to all citizens, will result in a warmer and drier climate. The impacts of this are varied, but species that can adapt will fare best.

There is reduced biological and structural diversity across the landscape. Rates, scales, and methods of forest management practices plus fire suppression are the chief causes, among others. Initiating forest management practices that replicate historical stand conditions and disturbance patterns will lead to increased biodiversity and ecological integrity.

Bull trout appear stable, but there is a decrease in westslope cutthroat and other native aquatic species (toads and aquatic plants). Brook trout, lake trout, and northern pike are all introduced species which negatively impacts native fish, other aquatic species, and anglers.

The increase in human population has resulted in more people attracting and feeding wildlife. This has led to conflicts in some instances and tends to concentrate some populations. The impact for the wildlife is negative. For instance, feeding deer near the highway encourages deer to cross and be killed. It is illegal to feed wildlife. Feeding bears, also illegal, makes them less wary of humans and creates conflicts, and increases bear mortality.

There is a decrease in population and distribution of native forest carnivores throughout the Swan Valley due to forest fragmentation, habitat values, and a reduction in their prey base.

Bird populations appear stable since local bird counts started a decade ago. Some populations may need further study. This includes determining whether there is an increase in populations of invasive bird species.

Keystone species are species that play vital roles in the health and vitality of an ecosystem, especially in response to natural disturbances. There is a decrease in keystone species such as beaver and whitebark pine. The decline or loss of keystone species would cause a negative impact throughout the ecosystems.

ECOSYSTEM TRENDS

Valley Bottom Ecosystem_____

Deciduous tree species (cottonwood, aspen, birch, alder) appear stable.

There is a growing awareness of rare plant populations in wetlands. This has led to an increased identification of *Howellia aquatilis* within the Swan Valley. Even so, there is a continued need to provide education, identification and additional protection of rare plants in wetlands.

There is disagreement about the condition of the wetlands. Some believe that wetlands in general remain in excellent condition. U.S. Forest Service, Plum Creek Timber Company and the Montana Department of Natural Resources and Conservation carefully follow water quality Best Management Practices (BMP's) and the Streamside Management Zone Law (SMZ). The U.S. Forest Service maintains a greater forested zone than required by BMP's or SMZ. The U.S. Forest Service also maintains undisturbed zones near isolated wetlands.

There is a decrease in the connectivity between potholes, the river and riparian areas in certain areas of the Swan Valley due to roads, logging and residences. This decrease interferes with wildlife movement. Although many wetlands and aquatic environments remain in good condition, some wetland, streamside and riparian environments have experienced substantial decline in resource values and integrity during the past 40 years.

The rate, scale and methods of harvesting on the uplands, particularly through the 1980s, impacted many reaches of the pothole complexes and their associated riparian areas throughout the Upper Swan Valley Landscape Assessment

Area. However, streamside zones were often left intact or only lightly managed which helped provide important habitats and connectivity for a diversity of species.

For a variety of reasons, through the late 1990s to 2002, removal of forest structure within streamside zones and riparian areas increased. This change in management emphasis has affected wildlife, particularly in the most critical remaining functional habitats and connections for many large and small animals on the valley bottom. Several direct impacts stand out. Over the past three or four years an increasingly greater proportion of the Mission Mountains slope elk bands have abandoned traditional wintering areas west of the river-highway corridor in search of functional habitats elsewhere.

Similar conditions in the historic east side winter range, such as reduced forest canopy on the uplands and in riparian and streamside areas, have compromised those winter range habitat values and connectivity. For example, wintering white-tailed deer are confined to patches of mature forest canopy within the river-highway corridor because of disruption of connectivity to the core winter range. Fisher and pine marten populations in the Valley Bottom Ecosystem have decreased in recent years.

In recent history, other disturbances such as fire and wind have affected the Valley Bottom Ecosystem. Low intensity upland fires, in the past, have entered the fringe of the riparian and wetland communities and burned individual or small groups of trees. Riparian areas associated with streams have a longer fire-free interval than adjacent upland sites. Sometimes high intensity, stand conversion fires burned through the Valley Bottom Ecosystem.

High intensity winds have occurred at intervals and caused extensive blowdown. Trees in wet areas are more prone to being blown over since their root structure is shallow due to the high water table.

Dense understory encroaches upon adjacent ponderosa pine resulting in uprooted trees. In addition to this problem, the threat of catastrophic fire and the loss of old-growth ponderosa pine and western larch stands near wetlands indicates a need for understory removal, dry fuel reduction and/or light burning near wetlands.

Reduced diversity and the loss of ecological soundness can diminish the ability of the forest to support multiple species of plants and animals. Disturbance and exposure of the soil can reduce its productivity and increase chances of soil erosion, sediments moving into clean water, or increases in noxious weed infestations.

There has been an increase in the residential development on or near the flood plain. Regulations for building in the flood plain are lacking in strength. The counties need to enforce existing regulations and adopt stricter rules.

Educational efforts for local citizens and property owners should continue stressing the importance of wetlands and wetland birds. Plum Creek Timber Company, U.S. Forest Service, and the Department of Natural Resources and Conservation need to be encouraged and supported in their protective actions. The Swan Ecosystem Center can help monitor when appropriate. There is a need to continue supporting wetlands education through the schools, field trips, study groups, exhibits, and monitoring.

Moderate, Warm Ponderosa Pine Ecosystem

There has been a decrease in the amount of mature ponderosa pine within the Swan Valley. Some of this is due to development of homesites or pastureland as well as timber harvesting. There is also a loss of mature forest canopy. Because of these factors, historical acreage of open pine habitats is reduced. Ayres' study identified about 25 percent (25%) of the watershed as open, mature ponderosa pine cover types. Today, there is less than 5 percent (5%). This has occurred in the Ponderosa Pine Ecosystem as well as the Valley Bottom and Cool, Moist Ecosystems. Harvesting of mature stands and establishment of dense plantations has changed the landscape.

The lack of natural frequent, low intensity ground fires and the subsequent in-growth of denser understories has left some mature stands more susceptible to catastrophic fire. This trend is negative for plant and animal species that need high quality, mature open ponderosa pine cover types. It will have a negative impact on the whole Swan Valley if a catastrophic fire occurs. It may be an opportunity, however, for some species, especially invaders.

Due to logging and fire suppression, the ponderosa pine and western larch in the Swan Valley are currently in an unnatural condition for these types of stands. Fire suppression has encouraged understories of shade tolerant species. These smaller trees become ladder fuels and put ponderosa pine at risk.

Cool, Moist Ecosystem

An accumulation of forest fuels in the Cool, Moist Ecosystem is creating an increased danger of catastrophic fire where fire has been suppressed and vegetation management has been reduced.

Forests in this ecosystem are now composed of dense, smaller trees and accumulated down wood. Fires used to occur more frequently and with lower intensity. Since a fire has not occurred for a very long time throughout most of the Cool, Moist Ecosystem, a fire could become very large and be very intense. The landscape pattern of younger managed stands interspersed with older stands was once thought to reduce the ability of fire to move across the landscape, but during drought years, fire can move quickly through either type as occurred in the Crazy Horse Fire of 2003.

Cold, Steep, Forested Ecosystem

There has been a significant decrease in the whitebark pine due to whitepine blister rust and bark beetles. This trend compromises this ecosystem and causes impacts throughout the landscape. Key ecological risk factors include the loss of whitebark pine and related animal populations through infestations by blister rust, bark beetle attacks, and encroachment by spruce and subalpine fir largely due to fire suppression.

The continuing decline of whitebark pine will have dramatic and long-term implications. The regulation and timing of snow melt and runoff plus the implications for stream flow and general hydrologic integrity of the Swan Valley watershed is significant but not well understood at this time.

The accelerated loss of remaining cone-bearing whitebark pine over the past decade has contributed to a dramatic shift in seasonal use areas by grizzly bears. It is now documented that there are increasing number of grizzly bears abandoning high elevation habitats in fall where pine nut resources are scarce to seek out more reliable food resources at lower elevations. A key fall food resource is road-killed deer and wildlife wounded by hunters as well as gut piles left by hunters. This occurrence has greatly increased the chance for human conflict as bears and people are brought into more frequent contact.

The shift of fire regimes, as whitebark pine is replaced by lethally-effected spruce and subalpine fir will change fire behavior and effects. The full implications are not well understood at this time.

Together these and other related factors will have many cascading and rippling effects throughout this ecosystem and throughout adjoining landscapes.

A decrease in available federal recreation and wilderness management funding has resulted in a decline in money for the care of the Mission Mountains Wilderness and the Swan Range. Local citizens have been raising matching funds since 1996 to support wilderness and backcountry ranger contracts. The program has been administered since 1997 by the Swan Ecosystem Center. In 2001, the Swan Ecosystem Center and the Kalispell-based Bob Marshall Foundation joined forces to care for the Mission Mountains, the Swan Range, and the Bob Marshall Wilderness Complex through cooperative agreements with the U.S. Forest Service.

An increase in all types of recreation including the motorized use of four-wheelers and snowmobiles in the backcountry creates major impacts upon the terrain and wildlife. It is illegal for four-wheelers to travel off-road or on closed roads outside of wilderness areas. Recreation should be managed to minimize the impact on fish, wildlife, and water resources while providing ample opportunity for recreational use.

Cold, Steep, Nonforested Ecosystem

Although snowmobiling in designated wilderness is illegal and extremely dangerous, people continue to access this ecosystem, especially in the Mission Mountains. It is difficult to assess to what extent this use is occurring and increasing. Overflights each year reveal snowmobile tracks. Faster, more powerful machines make it possible to reach higher elevations. A snowmobiler died when he fell hundreds of feet from the top of the Mission Mountains Divide near the Spider/Elk Lake area. The weight of his snowmobile broke the cornice he was resting on. (See previous paragraphs about backcountry trail maintenance and recreational use in the Cold, Steep, Forested Ecosystem.)

Recreational use in the Cold, Steep, Nonforested Ecosystem continues, but it is difficult to determine whether the trend is increasing or remaining stable, although the growing number of hiker-developed paths leading to Holland Peak and other areas, suggests the use is increasing. Although most wilderness and backcountry trails are not maintained at this elevation, increasing population in the region most likely is resulting in increased visitation to the higher reaches.

Increasing recreation use in the rocks and ice has the potential of displacing grizzly bears and mountain goats. More data are needed to assess the extent of stress wildlife are experiencing in this ecosystem.

Glaciers in the Mission Mountains and Swan Range have been decreasing in size for several decades and may soon disappear.

CONCLUSION

Because the diverse ecosystems within the Upper Swan Valley are so closely integrated, biological, social, or economic changes to one system impacts the others. State and federal agencies, private industry, and the public must take into consideration an ecological approach to their decision-making in order to establish priorities for the future.