

Final Report

to the

**Mohawk Watershed
Partnership**



**Prepared by the
Mohawk Watershed Education and Restoration Group
2003**

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Prepared by the Mohawk Watershed Restoration and Education Group,
Environmental Studies Service Learning Program,
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EXECUTIVE SUMMARY

BACKGROUND

The University of Oregon's Environmental Studies Service Learning Program (SLP) contracted with the Mohawk Watershed Partnership (MWP) in June of 2002 to complete a nine-month work-plan between University students and members of the Mohawk Valley. This partnership between the MWP and the SLP began in later September of 2002 and culminated in June of 2003. There were six main tasks the MWP wanted the students to accomplish. The main tasks included: creating, distributing and mailing a survey, creating educational posters about land use practices affecting the health of the watershed, interviewing land owners and creating a restoration handbook, participating with the ongoing water quality testing and making the results more accessible, conducting a recreational impact study of the area, and organizing a watershed clean-up day.

TASK 1 SURVEY

In March 2003 a survey was sent out to the approximately 1,600 landowners in the Mohawk watershed via the quarterly Mohawk Watershed Partnership Newsletter. The survey included 50 questions with topics varying from gender and age, to how community members felt about the MWP and if they were knowledgeable about what the MWP does. The survey return rate was unexpectedly low at only two percent.

Conclusions and Implications

Despite a low response rate, it seems that results came from a fairly equal amount of people involved and not involved with the MWP. Only 15% of the respondents indicated that they had served on a committee or the executive board of the MWP, which is equal to the percentage who indicated they do not want to become involved in MWP activities. The results of the survey encompassed both active and non-active members of the MWP, so it is still very useful for the MWP to use as tool to measure the community's involvement and knowledge about the MWP.

One aspect of the survey asked whether the respondents had conducted restoration work on their own property or helped a neighbor with such an effort. Of those who responded, 38% had attended a MWP meeting, while 41% had participated in a MWP work activity (clean-up day or tree-planting project). More than half of the respondents (53%) indicated they had done restoration projects on their own property.

Even though the survey did not yield a high rate of return, it can be modified and used again for future purposes. This was the first attempt of the MWP to learn how the residents felt about the group, the watershed, and their community.

For more details concerning this, see chapter 2.

TASK 2 EDUCATIONAL POSTERS

The MWP coordinator selected 12-15 topics she believed were important to the health of the Mohawk watershed. From this list, each SLP team member picked two topics he/she wanted to research. Each team member researched his/her topic and then interviewed a community member who had experience with that particular issue. The posters include the background information and details of the community members' accomplishments. These posters are designed to increase awareness and involvement from the community.

Conclusions and Implications

The ten completed poster subjects are: Native Landscaping, Recognizing and Controlling Invasive Weeds, Mud and Pasture Management, Organic Gardening, Manure Composting, Small Stream Enhancement, Western Pond Turtle Habitat Enhancement, Septic Tank Maintenance, Streamside Enhancement, and Wildlife Habitat Enhancement.

Creating these posters allowed the SLP team members to meet and work with community members and provided community members the opportunity to share their restoration accomplishments with others.

For more information see chapter 3.

TASK 3 RESTORATION GUIDEBOOK

On-site interviews were conducted with landowners who had completed restoration work on their properties in the Mohawk Valley. Detailed write-ups and photos for each project have been compiled into a restoration guide booklet. The booklet will help encourage other valley residents to undertake their own restoration work and answer many typical questions for those considering similar project. The booklet also includes information about receiving land grants.

Conclusions and Implications

Landowners share these important considerations:

- Federal and state grants are available to cover costs of restoration work. In some cases reimbursements can total 100%. These agencies also offer expert advice and knowledge of regulations that might impact your work.
- Grant contracts involve long-term maintenance provisions and it is also important to understand exactly which costs are reimbursable.

- Remember to talk with other valley residents who have already done projects like the one you are considering. They have personal experience and helpful guidance.

For more information see chapter 3.

TASK 4 WATER QUALITY ANALYSIS

Since September 1998, the MWP has been collecting and testing the water quality in the Mohawk River. There are three sites that are tested: Hill Road, Wendling Road, and Weyco Gate. Members of the MWP, community volunteers, and high school and college students all help collect test samples. The MWP asked the SLP team to collate and analyze three years' worth of collected data. Also, SLP team members compared some of these results with similar data from the Santiam River, located east of Salem, Oregon.

Conclusions and Implications

Until now the water quality data has not been easily accessible, formally analyzed, or compared to testing sites on other rivers. The graphs created by the SLP team communicate the data in a visual and interesting way to that will help community members understand trends and patterns of water quality in the Mohawk River.

For more information see chapter 4.

TASK 5 RECREATIONAL IMPACT STUDY

A recreational impact study was conducted by the SLP of the Upper McGowan sub-basin. The SLP team was assigned to assess the recreational impacts of this area and make suggestions to the MWP that would work towards reducing the overall impact. The upper McGowan Creek area is heavily forested and sparsely populated, making it a great place for shooters, off-roaders, and others to enjoy outdoor recreation. The SLP team created a PowerPoint presentation that can be delivered to recreational users that would show how their actions are affecting the health of the watershed. It also aims to educate and inform individuals of the importance of responsible recreational use.

Conclusions and Implications

Minimizing recreational impacts is difficult because many of the undesired human activities result from efforts to avoid cost. Trash dumping occurs in the watershed so people do not have to pay to dump their trash at other locations. However, a great deal of the trash is from shooters, so better promotion of the Gun Club could minimize the human and environmental effects that are left by the shooters.

Between November 2002 and March of 2003, 35 sites were found and mapped that had significant human impacts. Maps and spreadsheets were created to identify these sites as well as

rank the sites in order of human impact. From this, four sites were identified and chosen for cleanup during the “Down by the Riverside” clean-up event.

For more details see chapter 5.

TASK 6 WATERSHED CLEAN-UP DAY

In May of 2003 a clean-up day was planned and organized by the SLP in conjunction with Laurie Mullen, the MWP Coordinator. This event, along with many other similar clean-up events around the state of Oregon, was sponsored by SOLV.

Conclusions and Implications

This event brought together 23 community members and student volunteers. Approximately 4 tons of garbage was collected along with 11 tires and a flatbed truck completely filled with recyclable metal!

Chapter One

Introduction

This chapter identifies the following as major issues for the Mohawk Valley: The topics covered include economic development, agriculture, livestock, illegal dumping, flood history, flood mitigation, illegal dumping, and recreational/off-road activity. Each of the issues is discussed below in more detail.

Economic Issues in the Mohawk Valley

History

The pastoral Mohawk Valley of today offers little evidence of a local timber boom that took place during the first half of the 20th century. The early economy of the valley was heavily dependent on the extraction of timber resources. As was often the case during this period, the resources were depleted and most timber companies were forced to move on (*see table 1.1*). Current valley inhabitants are a close-knit community who enjoy a quiet rural lifestyle, with little risk of being engulfed by nearby suburbia.

The first Euro-American settlement of the Mohawk Valley occurred during the mid-1800s with the first Post Office established at Marcola on 20 December 1862 (Polley 1984; Downing 2002). The town was named for its first postmistress, Mary Cole. Early on, logging was the major economic enterprise in the valley. The first sawmill was built in 1875 and powered by Mill Creek. Near the end of the 19th century, a Southern Pacific Railroad line in the valley facilitated movement of logs and lumber from the mills. A joint venture between Southern Pacific and the Booth Kelly Lumber Company led to the establishment of Wendling (a company town) at the upper end of the valley. By 1901, Wendling was a thriving mill town with a rail depot, a sawmill, and a Post Office. During the same period, Fischer Lumber Company built a three-mile long flume to move logs down the valley to Marcola. Here logs were planed and the finished lumber

was shipped out via rail. Over the next few decades, advances in logging technology increased production. By the early 1920's, Booth Kelly and other smaller operations collectively employed

Table 1.1: Timber History of the Mohawk Valley

<p>Late 1800's</p>	<ul style="list-style-type: none"> ◆ Land granted to settlers through federal legislation: <ul style="list-style-type: none"> • Oregon Donation Act of 1850 • Homestead Act of 1862 • Education Land Grants 1859 • Railroad land grants ◆ Mill Creek, the area's first mill, is built by Arch Rader, a miner from Idaho <ul style="list-style-type: none"> • Mill Creek was water powered and had a vertical saw • During this time, the local lumber market in Marcola was small. Lumber had to be hauled to Eugene or Harrisburg to be sold • 1892, the Mill was closed down ◆ 1894 – First dam built on the Mohawk River <ul style="list-style-type: none"> • This splash-dam was built to transport logs more efficiently down the river ◆ 1890-1910 – Height of river traffic <ul style="list-style-type: none"> • Thousands of logs carried on the Mohawk River ◆ 1890's – Southern-Pacific Railroad Co. brings economic boost to region <ul style="list-style-type: none"> • Railroad gave access to both freight and passengers ◆ 1894 – Booth-Kelley Lumber Co. established <ul style="list-style-type: none"> • First Willamette Valley lumber manufacturer to engage in interstate trade ◆ 1898 – Booth-Kelley seeks to expand operations, begins business relationship with Southern Pacific Railroad ◆ By 1900 Booth-Kelley: <ul style="list-style-type: none"> • owns 3 mills in Lane County • owns 100,000 acres of timber land • cuts an average of 100,00 ft of timber in 10 hours using 23 men at one mill • cuts on average between 40,000 and 50,000 feet of wood per acre harvested ◆ During this time, Lane County has more standing lumber than any other US county
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Table 1.1 continued

<p>Early 1900's</p>	<ul style="list-style-type: none"> ◆ Fischer Lumber Co. established <ul style="list-style-type: none"> • Built a three-mile long lumber flume (an inclined channel to convey water as power) to Marcola where they had their planing mill and loading docks. ◆ 1904 – Booth-Kelley was closed down by the government for 2 years because of dealing illegally with Southern-Pacific Railroad in the procurement of timber <ul style="list-style-type: none"> • Southern Pacific Railroad was selling timber rights to Booth-Kelley on homestead land, a violation of federal law • During this 2-year closure, workers moved elsewhere to find jobs and returned once the mill reopened ◆ 1910 – Mohawk Lumber Co. started railroad logging ◆ 1915 – Northwest logging industry went to ‘high lead logging’, a logging technique that lowered logs down steep terrain by steam-powered winches. ◆ Booth-Kelley had several different logging camps near Marcola. ◆ 1921 – Booth-Kelley employed 250 men, with 26 miles of 60lb. track & 20 flat cars ◆ Coast Range Lumber Co. in Mohawk Valley had 150 employees & 16 logging trucks ◆ Mohawk Lumber Co. had 7 logging disconnect trucks, a type of freight truck with a supporting ‘bunk’ for carrying logs ◆ 1929 – Depression - Booth-Kelley closed <ul style="list-style-type: none"> • Whole valley affected, loggers and mill workers lose jobs ◆ 1934 – Booth-Kelley reopened, expands operation outside of Mohawk Valley ◆ 1939 – Saw mills in Marcola abandon railroad and flumes, begin truck logging ◆ By 1946, Booth-Kelley was removing railroad track above Wendling because timber was exhausted ◆ 1956 – Fischer Lumber Co. liquidates its mill ◆ 1959 – Booth-Kelley sold to Georgia-Pacific
<p>After 1920</p>	<ul style="list-style-type: none"> ◆ Mohawk Lumber Co. had 7 logging disconnect trucks, a type of freight truck with a supporting ‘bunk’ for carrying logs ◆ 1929 – Depression - Booth-Kelley closed <ul style="list-style-type: none"> • Whole valley affected, loggers and mill workers lose jobs ◆ 1934 – Booth-Kelley reopened, expands operation outside of Mohawk Valley ◆ 1939 – Saw mills in Marcola abandon railroad and flumes, begin truck logging ◆ By 1946, Booth-Kelley was removing railroad track above Wendling because timber was exhausted ◆ 1956 – Fischer Lumber Co. liquidates its mill ◆ 1959 – Booth-Kelley sold to Georgia-Pacific
<p>Currently</p>	<ul style="list-style-type: none"> ◆ 85% of the Valley is forested ◆ Maximum timber production is still assumed to be the goal ◆ Weyerhaeuser Co. owns a large portion of forested land in the valley <ul style="list-style-type: none"> • They operate on a 40 to 50 year rotation harvest, replanting within 1 year • 60,000 acres of forest land to be at ‘early seral succession’ ◆ Any future management activities will follow Oregon’s Forest Practice Act

Source: Natural Resource Conservation Service. Mohawk River Watershed Assessment Natural Resource Conservation Service in 1999; Polley, Louis E. A History of the Mohawk Valley and Early Lumbering. Marcola, OR: Polley Publishing, 1984.

over 400 workers in the valley (Polley 1984). Marcola had three lumber mills, two vaudeville theatres, motels, stores and train service twice a day (Rural Development Initiatives, Inc. 2002).

In the early 1930's, these companies began running out of timber to harvest. The Great Depression, coupled with depleted timber stands led to several mill closures. Some of the companies turned to smaller scale truck logging as means of moving logs to mills in Eugene and Springfield. In 1946, Booth Kelly removed rail lines above Wendling and by 1952 the Wendling Post Office closed. In 1956, Fischer Lumber Company liquidated its Marcola mill, punctuating the end of the timber boom in the valley (Polley 1984). Weyerhaeuser's recent purchase of Willamette Industries gives them the largest timber holdings in the valley. Recent timber cutting by corporate and individual landowners is relatively minor compared to historic levels, as most owners look to achieve more sustainable harvests.

Demographics

Today, Marcola is home to approximately 700 people, having remained the primary community in the valley over the last half century. A majority of valley residents commute into Springfield or Eugene for work, with only 4.14% working at home according the most recent census data. Most (81.3%) own their homes and some acreage of land. The median home cost is \$128,730, while median income is \$15,976. Many locals are lifelong valley residents. The median age in the valley is nearly two years older than the Lane County average, suggesting a higher percentage of retirees. A few families have large land holdings in the valley. Most engage in raising livestock, hay production, and some small-scale logging. Marcola has several small family-owned, community-oriented businesses (restaurants, markets etc.). Currently, there are no major employers in the valley (Rural Development Initiatives, Inc. 2002).

Today, Marcola is home to approximately 700 people, having remained the primary community in the valley over the last half century.

Economic Growth and Development

Major obstacles stand in the way of economic and residential development in the Mohawk Valley. Marcola is the primary settlement in the valley, yet it remains non-incorporated. Without a local tax base, there are limited ways to generate funding for infrastructure improvements or the municipal services needed to attract development. Additionally, the valley lies outside the urban growth boundary of Springfield so it cannot be annexed or take advantage of city police and fire services. A few new homes have been constructed in recent years, mostly on riverfront lots outside of town. Marcola offers no municipal water or sewage treatment systems, so new construction requires drilling a well and installing a septic system. Adding such infrastructure would require incorporation, a major initial investment, and long-term property tax increases for the town's residents. Broad-based community support for such measures seems unlikely.

Many properties in Marcola are plagued by outdated and deteriorating septic systems. These homes cannot be sold because they do not meet current septic system codes. During heavy rain events, many of the towns septic systems overflow, resulting in pollutant and bacteria runoff into the Mohawk River. Many view these problems as the most important issues facing Marcola's residents. Community leaders are exploring the possibilities of federal or state funding to help offset the cost of septic upgrades (Thompson 2002).

Strategic Planning

In January 2002, the Marcola Planning Group engaged Rural Development Initiatives Inc. to help define and develop a strategic plan for the community. The completed plan, published in June 2002, defines a list of both short and long-range goals for improving and maintaining the quality of life in and around Marcola. This report profiles both the assets of the community and the primary concerns of its residents. Four primary goals were identified:

- ◆ **Infrastructure Goal #1** – Marcola has a safe, nicely landscaped highway system with an efficient and ecological water drainage system.
- ◆ **Quality of Life Goal #1** – Marcola's town square is attractive and neat
- ◆ **Quality of Life Goal #2** – Visitors feel welcome in Marcola

- ◆ **Quality of Life Goal #3** – Marcola is a community where people are informed, concerned, and involved with local events and achievements.

The main goal of the report was to gather data about the community's population and develop a collective vision for the future of Marcola. Beyond the concerns addressed by the goals above, there seems to be a high level of satisfaction with the quality of life in Marcola. The valley residents are proud of their school, small town atmosphere, nearby recreation opportunities, and the pool of talent available for community projects. Proximity to Eugene and Springfield is also viewed as an asset. Their greatest concerns include lack of a stable funding source for infrastructure improvements, problems with septic and drainage systems, the town's appearance, and lack of business opportunities (Rural Development Initiatives, Inc. 2002).

Recreation in the nearby Coburg Hills is one of the major attractions to the Mohawk Valley. Hunting, target shooting, off-road trail riding, camping, and hiking bring visitors from nearby urban areas. Unfortunately, illegal dumping, vandalism, and unauthorized off-road activities have spoiled some of the natural value of the area. Valley residents welcome these visitors and the economic opportunities they present, but they are concerned about damage to the Mohawk watershed's natural resources. The Mohawk Watershed Partnership is currently working to quantify the recreational activity in the valley and looking at ways to encourage recreational users to lessen their impact on the landscape.

The Strategic Plan demonstrates that Marcola's residents are realistic about potential development. There appears to be a clear understanding that until infrastructure and drainage issues are settled, economic growth is likely to remain stagnant. There appears to be very little movement towards incorporating or attempting to attract significant residential development. However, there is an underlying concern that without some improvements, it may be difficult to attract younger families and maintain the population in the future.

Agriculture

In the Mohawk Valley there are approximately 115,000 acres ranging in elevation from 450 feet to 3900 feet. The upper portion of the valley, approximately 97,000 acres, is mainly large Bureau of Land Management forest land and industrial forest land owned by Weyerhaeuser. The lower 18,000 acres are along the stream corridor and are comprised of mostly private agricultural land, small timber farms, and rural residential home sites. Within this lower area, commercial land is primarily used for timber, pasture and hay, christmas trees, hazelnuts, nurseries, and specialty products. This corridor is the most productive area for agriculture in the Mohawk Valley. However, about 13% of this land is dedicated to grazing land/vacant lands while only 1.2% is dedicated to small acreage farms and 0.1% is dedicated to orchards, vineyards, and croplands (Natural Resource Conservation Service 1999).

Approximately 1,482 acres of land in the Mohawk valley are small acreage farms, and about 200 acres are dedicated to cropland.

There are approximately 295 farms and/or ranches in the valley, most near the town of Marcola. The average farm size is less than twenty acres, with a maximum size of around 640 acres. The major crops of the Mohawk valley are timber, hay, Christmas trees, hazelnuts, and hybrid poplars. The majority of agricultural land is hay and pasture production, but crops such as blueberries, mint, and pumpkins can be found in a few places (Natural Resource Conservation Service 1999).

Most of the non-forested agricultural land is under-utilized. The agricultural land typically has low returns and few acres dedicated to high value crops. In the Mohawk River Watershed Assessment, the Natural Resource Conservation Service (NRCS) says, “The total economic impact of the farming and ranching industry is relatively low” and that “Many residents participate in agricultural activities for lifestyle rather than a main source of income.” (1999, p. 14). Many of the residents even lose money in agriculture. The majority of residents work in town and only part time on a farm or ranch.

Livestock

Livestock production appears to have a large impact on the Mohawk watershed. Some of the pastures in the watershed are in flood prone areas, which have the potential to add manure and sediment to the rivers. There are some farm pastures near rivers and creeks that have a build-up of animal wastes that can wash down into the waterways. The NRCS says,

“On an estimated 80% of the farms, winter feeding takes place on pastures. Wintering on wet pastures causes soil compaction, manure runoff potential, and trampling of forage. On an estimated 4-5 larger farms, stored manure from confined winter feeding areas could affect soil condition and water quality” (1999, p. 66).

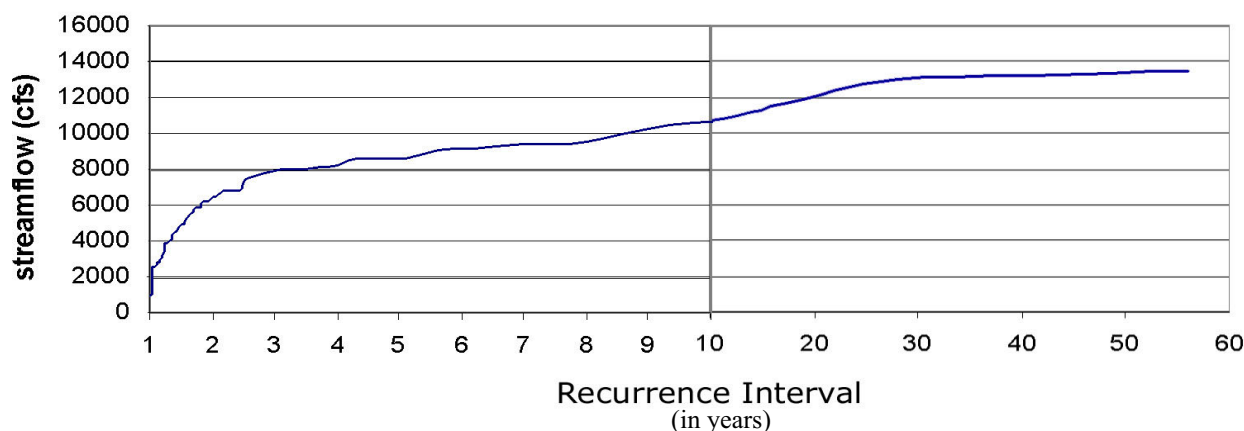
Of the 295 small acreage farms in the Mohawk Valley, 20% have pastures and confined feeding areas that directly impact watershed runoff into streams and rivers. Lack of knowledge about proper waste management increases the potential for impacting water quality throughout the valley. Livestock often have direct access to drainage ditches, spring outflows, and from streams, which threatens the integrity of the water quality from these sources. The NRCS says there is a shortage of “good quality water in controlled livestock watering systems that keep livestock away from sensitive riparian areas” (1999, p. 66).

The number of livestock operations in the Mohawk Valley is increasing, but in 1999 livestock operations were made up of thirteen larger beef cattle operations and several small farms with less than fifteen heads apiece. There is one large horse farm with twenty heads and many small places with less than ten heads each. Of these, there are a total of six confined feeding operations (Natural Resource Conservation Service 1999).

Flood History

Flooding in the Mohawk valley occurs naturally, sporadically, and with varying levels of intensity (*see figure 1.1*). Elevated stream levels that cause flooding are influenced by many variables, mainly rainfall, snowmelt, and human intervention. The latter category can include anything from dams to urban development. Whereas dams lessen the effects of flooding, land use practices like deforestation and asphalt surfacing may intensify the magnitude of flooding events

Figure 1.1: Flood Frequency Curve for the Mohawk River



Graph represents 55 data collection points from selected years between 1936 and 2000 at USGS gaging station #14165000 near Springfield, OR. <http://waterdata.usgs.gov/or/nwis> 3 April 2003. Data assembled into current form by the editor.

by speeding the rate at which surface run-off reaches the stream system. Major flooding events are often the result of several factors in unison with each other.

The largest recorded flood in the Willamette Valley occurred in 1861. The flooding affected most of the Willamette Valley, including the Mohawk Valley. Other major floods to hit the Mohawk Valley also took place in 1964, 1972, and 1996 (Natural Resource Conservation Service 1999).

During the most recent major flood event in 1996, the Mohawk Valley and its residents suffered significant damage. At one point measured rainfall reached more than two inches in six hours. The heavy rains raised stream levels high enough that 1200 to 1500 people were evacuated from their homes. Significant flood damage occurred along the Mohawk River from Marcola to

Springfield. In addition, several fields were flooded, vegetation was destroyed, structures were damaged, streambanks eroded, and the Marcola road was forced to close. The damage in Lane County was recorded at nearly \$19 million. Flooding events can also jeopardize water quality and damage fish spawning grounds (US Army Corps of Engineers 1997).

Flood Mitigation

Relatively little has been done to mitigate flood damage in the Mohawk Valley. Currently, there are no dams or other substantial means of flood control in the area. In the 1940's, the US Army Corps of Engineers identified seventy-eight possible dam and reservoir sites in the Willamette Basin including a reservoir site near the mouth of the Mohawk River. The proposed Mohawk River site was later rejected when considered against other identified sites. A key reason for the rejection was the loss of 4300 acres of valuable agricultural land if the reservoir was built (Hayes 2002; US Army Corps of Engineers 1948).

... eleven splash-and-log dams were built starting in the late 1800s and early 1900s.

At one time, dams did exist in the Mohawk Valley (*see figure 1.2*).

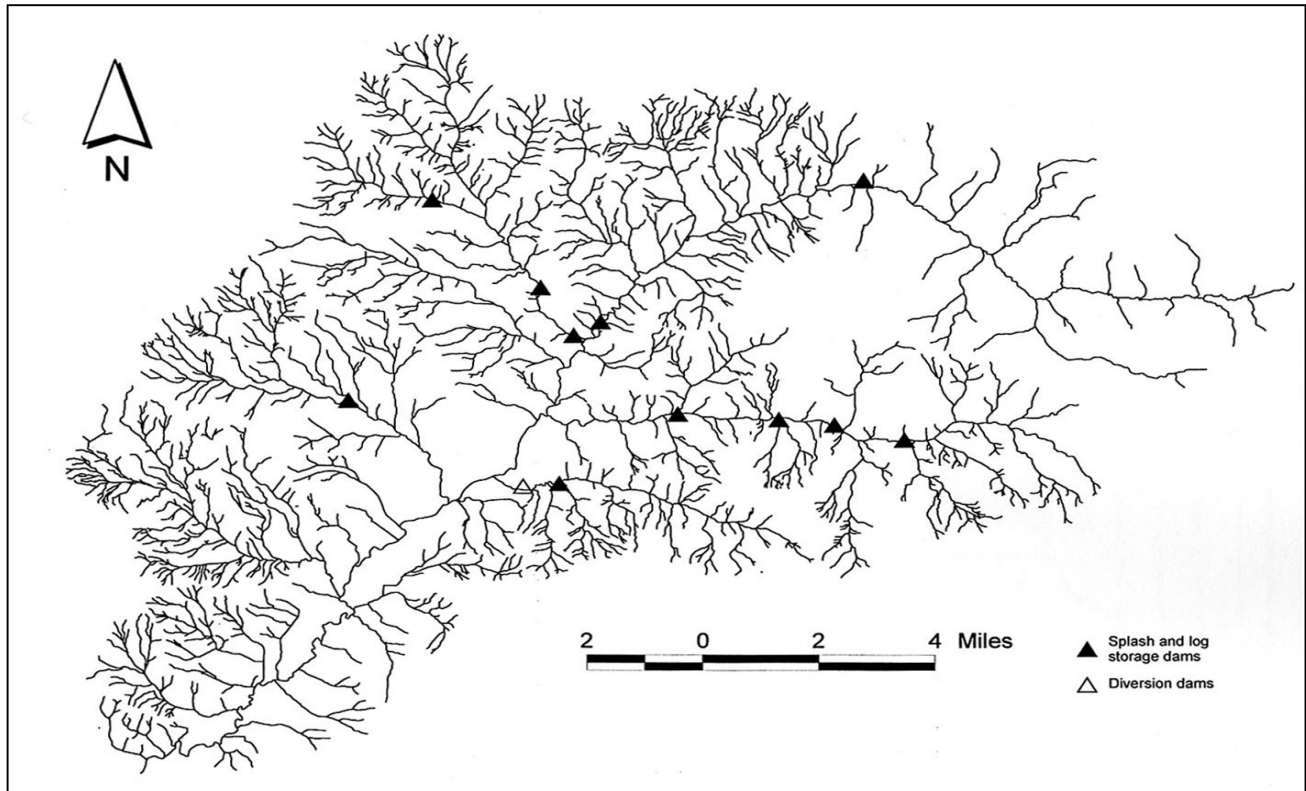
However, these dams were not built as flood mitigation but rather for timber purposes. One diversion dam and eleven splash-and-log dams were built starting in the late 1800s and early 1900s. This series of dams was used to transport logs by flooding areas so logs could be floated and transported downstream. Between 1894 and 1910 thousands of logs were moved (Huntington 2000).

These dams had detrimental effects on the natural environment. The log drives created by timber companies scoured riverbeds, sometimes down to the bedrock, and damaged riparian vegetation. The dams also blocked migratory fish passages to a substantial portion of the watershed. By 1910, the spring Chinook in the Mohawk River was thought to be extinct. Around the same time, the last log drive occurred. Over time, the logging dams have been removed (Huntington 2000).

Approximately ninety percent of the historic wetlands in the Mohawk Valley have been converted. Currently, three percent of the watershed is either wetlands, flood-prone, and/or has hydric soils (Natural Resource Conservation Service 1999). The United States Geologic Survey

maintains one water gage (141615000) on the Mohawk River. Located approximately one and a half miles from the confluence with the McKenzie River, it is the only water gage in the watershed (US Army Corps of Engineers 1997).

Figure 1.2 Locations of Historic Dams



Source: Huntington, Charles W. *A Supplemental Assessment of the Mohawk Watershed*. Canby, OR: Clearwater Biostudies, Inc., 2000. Prepared for the Mohawk Watershed Partnership. p. 29.

Neither the US Army of Corps of Engineers nor any other agency has current plans for flood mitigation in the Mohawk Valley.

Illegal Trash Dumping

The effects of trash within the Mohawk Valley can be seen throughout the area. Along old logging roads, on the banks of the watershed's rivers, creek, ponds, and on the forest floor, many types of trash can be found that is being illegally dumped (*see figure 1.3*). These items include old water heaters, couches, roofing shingles, and various items of small litter. Although not as large as discarded household items, small-item litter affects the widest area of the valley. Items like cups, beer bottles and cans, paper products, and a variety of other products can be seen

throughout the valley. Although these items are small and do not represent a large impact in itself, the cumulative effect of illegal dumping and littering becomes an ugly and widespread problem.

Residential trash like large, bulky household items is not very toxic but do have their own impacts. This impact is mostly aesthetic. Residential trash threatens the natural beauty of the watershed.



Figure 1.3: Trash like this abandoned water can be found through the Mohawk Valley

The areas affected by illegal dumping vary from accessible on-road sites to secluded forests. On-road sites have a higher percentage of large household items because it is more accessible. Secluded sites have smaller trash, mainly small-item litter that people are not willing to pack out. An example of this is ‘party trash’. Because of the area’s proximity to Springfield, it is a popular hangout for teenagers looking to party away from the authorities. This creates a lot of trash like beer cans, bottles, and fire pits (Dean 2002).

The BLM is responsible for cleaning up garbage found along roadways and has tried different ways of preventing trash dumping throughout the valley. There is a local waste facility - Shotgun Park transfer station - where people can pay to have large items like old sofas or beds disposed of properly, but it is cheaper and more convenient for some people to discard their household items illegally. Title III of the Oregon Forest Practice Act created a tax on timber sales, which funds a trash cleanup crew. The county provides inmates from local prisons to work with the BLM to clean up and catalog dump areas. This has been very effective in cleaning up the valley and mapping troubled spots. After the trouble spots are mapped, a trash officer patrols the area to prevent further illegal dumping. If people are

The Mohawk Valley is large and lacks the resources needed for enforcement. Consequently, trash continues to build up on logging roads, stream banks, and forest floors.

found dumping trash and refuse to pick up and remove it, they can be ticketed and fined (Keller 2002).

This management approach to curb illegal trash dumping has been partially effective. However, the Mohawk Valley is large and lacks the resources needed for enforcement. Consequently, trash continues to build up on logging roads, stream banks, and forest floors. The most effective solution to reduce trashing in this case lies with changing the attitudes and values of those that perpetrate the offense.

Recreational/Off-Road Activity

Since the turn of the twentieth century, the Mohawk Valley has seen increasing development. Over-harvesting has eliminated many of the old growth forests that covered the land and has left miles of logging roads, fire roads, and clearings that now mark the landscape. Today people use these gaps in the forest for many different types of recreation. It is common to see people driving off-road vehicles, like dirt bikes and all terrain vehicles (ATV), on the old roads and trails in the Mohawk Valley. Riding off-road vehicles is a legitimate recreational activity, which must be practiced safely and responsibly. To this end, the BLM has recognized off-roading in the valley as a recreational activity and has begun managing trails, created a guidebook, and is educating riders on how to ride responsibly (Keller 2002).

Driving off-road vehicles presents complicated issues of personal liability in relation to land ownership. The land within the valley is set up in a checkerboard pattern of private and public land. Therefore, some public trails cross private property (Rice 2002). Because driving off-road vehicles is a dangerous sport, questions of liability arise when riders drive through private lands, putting those landowners at risk.

The natural environment of the Mohawk Valley is impacted when riders create rogue trails that compact soil. As the soil becomes compacted, plants cannot grow and water cannot be absorbed into the ground. This creates a high amount of water runoff over rogue trails. This water collects

in low areas on the trail and creates muddied patches. Riders run their bikes or ATV's through the mud, destroying the land around it and affecting the natural environment. It is important for riders to travel on maintained trails to prevent muddied patches and destroyed vegetation from becoming a common feature in the Mohawk Valley (Keller 2002).

To help guide riders, the BLM has compiled five years of trail data into a soon-to-be-published trail guide. This guide will show people appropriate trails, forest boundaries, and common laws that will help the public understand the negative results of creating rogue trails. The BLM, along with the Northwest Youth Corps, has also labeled trails throughout the valley by putting signs up on trees that designate trails and forest boundaries. With the guidance of the BLM, the Northwest Youth Corps also helps maintain off-road trails through leveling, creating drainage areas, and by adding dirt and gravel. Trails that go through waterways are fixed by curving the trail away from the water or by placing large boulders in front of the trails (see figure 1.4), preventing vehicles from entering rogue trailheads or riparian areas (Keller 2002).



Figure 1.4: These boulders were placed to restrict trail access.

There has been much progress in protecting the valley while also facilitating off-road recreation. There are currently ten to twenty acres of old logging roads and fire trails that have been converted into off-road trails. These trails have been mapped and inventoried using global positioning systems, creating the foundation for a trail guide. Better public outreach in the way of informational kiosks are also planned, making the public more aware of the negative results that off-roading has on wildlife and forests, and to help people enjoy off-road recreational activities while acting safely and responsibly.

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Chapter Two

Introduction

A key component in generating interest for a community project is a clear understanding of the attitudes and issue awareness of the local residents. For this reason, the Mohawk Watershed Partnership (MWP) decided to conduct a survey of Mohawk Valley residents in the spring of 2003. The MWP board called upon the Service Learning Program student team to develop and implement the survey as part of a yearlong partnering effort between the SLP and MWP.

Purpose

The primary goal of this survey was to evaluate the degree of understanding local residents have about watershed issues and the activities of the MWP. More specifically, they hoped to discover what issues are most important and what activities and methods of communication are most effective in motivating members of the community to become actively involved in the MWP's efforts to enhance the Mohawk watershed. The partnership also wants to use the response to this survey as a baseline to compare with future responses to this or other surveys. Also, this survey will serve as a means of assessing the overall effectiveness of their outreach efforts.

Methodology

There are several aspects to producing a survey including developing questions, determining most likely responses, formatting, graphic layout, choosing a method of distribution, collecting completed surveys, creating a database for the responses, analyzing the response data, and creating a final report. Steve Mital (SLP Coordinator) developed the survey questions and format with input from both SLP team members and the MWP board. The MWP newsletter editor, Linda Mooney, created the four-page survey layout that was included in the March 2003 issue of the MWP's quarterly newsletter. This newsletter (and the survey) was distributed via mail to all 1600 homes in the Mohawk Valley. The MWP placed collection boxes for completed surveys at the Mohawk General Store and the Tomahawk Restaurant in Marcola. On-site

incentives (free soda and popcorn) were offered to any residents returning surveys at these businesses. Respondents also had the option of returning surveys to the MWP by mail.

After the surveys were completed and returned, members of the Service Learning Program team created a database using FileMaker Pro software. Using this software program, team members organized and analyzed the survey results. One team member produced an initial report that contained a percentage breakdown of responses to each question (see appendix A). This team member also produced a Microsoft Excel spreadsheet of all the responses, enabling the Service Learning Program team to create charts and pie graphs to graphically convey survey results. Other team members developed several queries to further analyze the results using the FileMaker Pro software.

Survey Results

The MWP and SLP hoped for a response rate of 15-20%, assuming that many valley residents would be anxious to voice their opinions about issues and activities likely to impact their properties and general quality of life. Out of the approximately 1600 surveys mailed, only 34 completed surveys were returned. Most of these surveys were dropped off at one the two collection boxes, with only a few that were mailed. Initially, there was concern that this small sample (2.12%) had come from a minority of community members who were already heavily involved in partnership activities. Based on the responses, it seems clear that many of the completed surveys came from local residents who had little interaction or previous involvement with the partnership. Only 15% of the respondents indicated that they had served on a committee or the executive board of the MWP, which is equal to the percentage who indicated they do not want to become involved in partnership activities. Given the small sample size, it is difficult to make a strong case for this data being statistically valid for the entire valley population. However, we feel that a broad enough cross-section of the community is represented to formulate some general assumptions and conclusions. Complete survey results can be found in Appendix A.

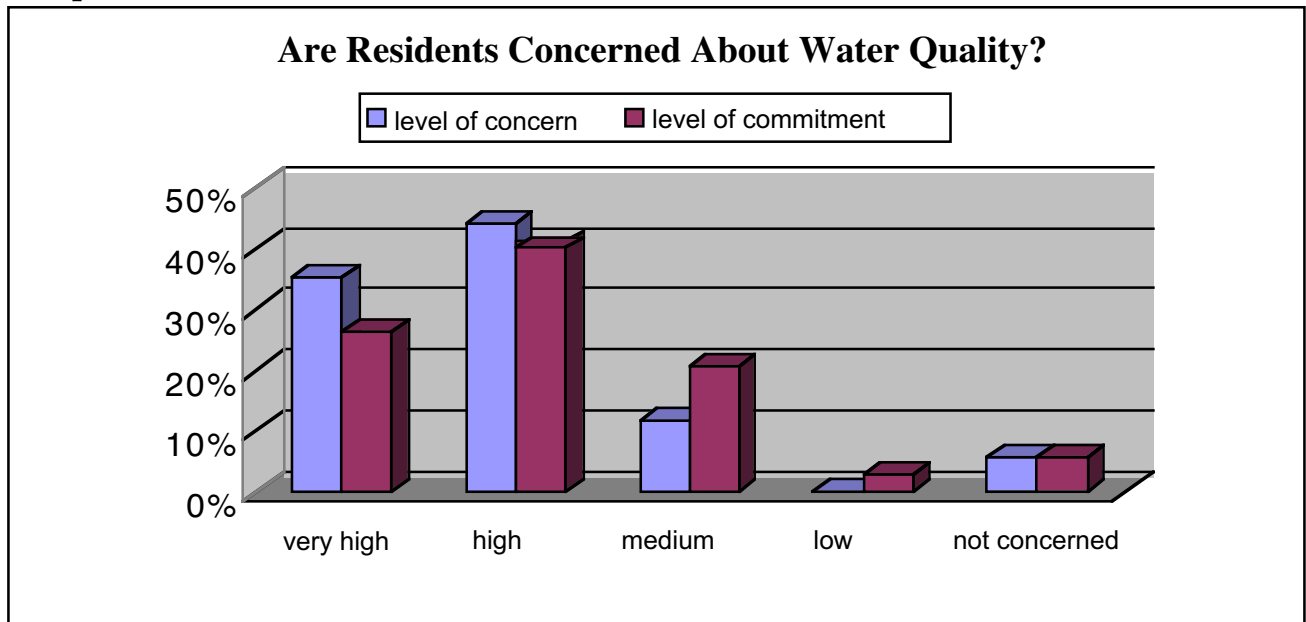
Out of the approximately 1600 surveys mailed, only 34 completed surveys were returned.

Survey Questions and Answers

The first nine questions on the survey were designed to assess community attitudes and awareness relating to a variety of issues facing the MWP in their effort to enhance the watershed. Respondents were offered six response options for each of the statements (strongly agree, agree, neutral, disagree, strongly agree or don't know). Overall, respondents overwhelmingly agreed that improving water quality and fish habitat are important issues in the watershed and that streamside restoration and livestock fencing projects contribute to better water quality. The vast majority of respondents believe that invasive plants, illegal dumping, and, to a lesser degree, off-road vehicles (ORV) and poorly maintained septic systems are problems in the Mohawk Valley. The question bringing the broadest range of responses dealt with "current timber practices" and whether they are a "major barrier" to improving water quality in the valley.

Questions 10-11 allowed respondents to rate their level of "concern" and "commitment" to improving water quality in the valley. Generally, the level of concern was slightly higher than the level of commitment with only 6% having no concern.

Graph 2.1

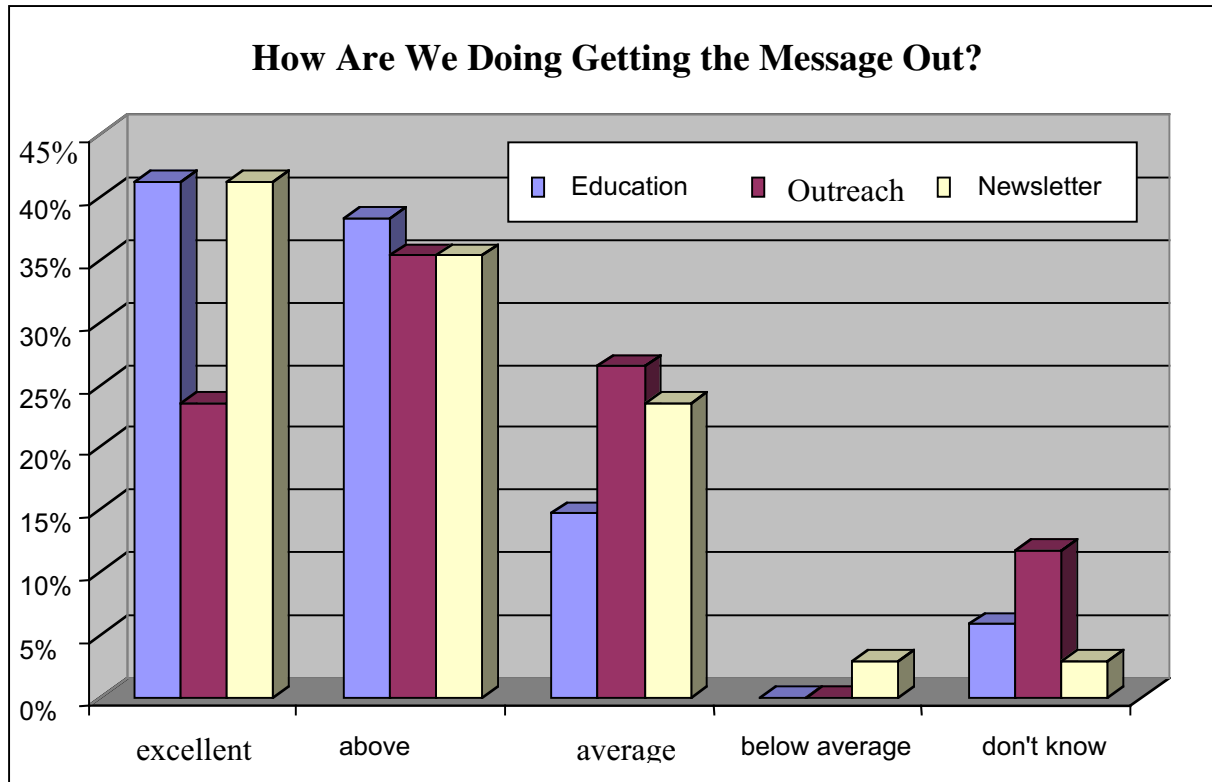


This graph compares how respondents rated their own level of concern about and commitment to improving water quality in the Mohawk Valley.

Questions 12-25 were focused on determining how well valley residents understand the MWP and its activities. Fifty-three percent correctly responded that the partnership is a volunteer organization (question 12), while 32% believed that it is a state agency. As was the case with several questions, some respondents failed to offer any answer (15% on this question).

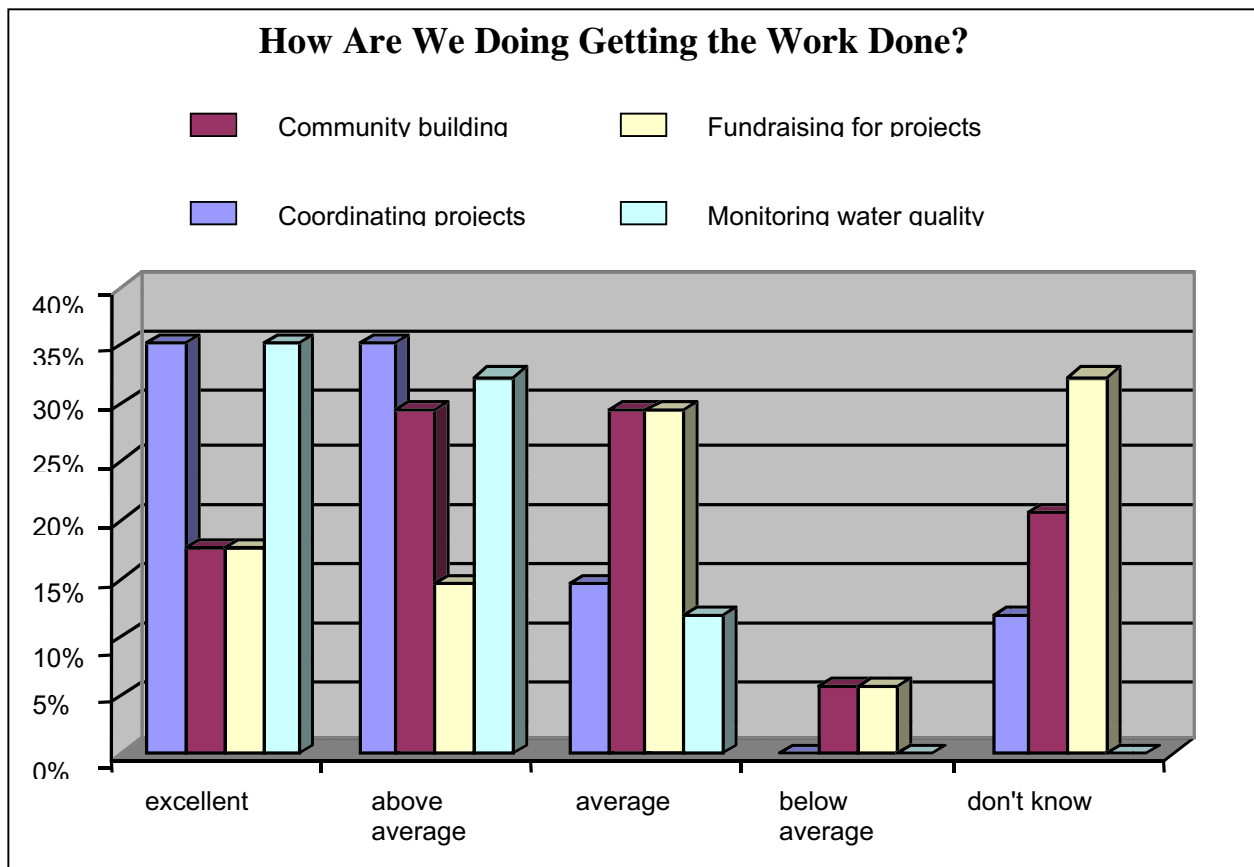
Questions 13-25 offered a variety of statements about MWP membership restrictions, activities, jurisdiction, and lawmaking capacity. For 9 of the 13 questions, at least 85% of the respondents answered correctly. This suggests that the partnership has done a good job of educating valley residents about who they are and what they do. There were three areas where some confusion exists. On question 14, 21% of the respondents believe that the MWP can enforce local, state, and federal laws relating to endangered species protection. On the following question, 18% incorrectly believe that the partnership can draft laws aimed at improving water quality. Finally, 24% of the respondents believe that a valley resident must be a landowner to be involved with the MWP.

Graph 2.2



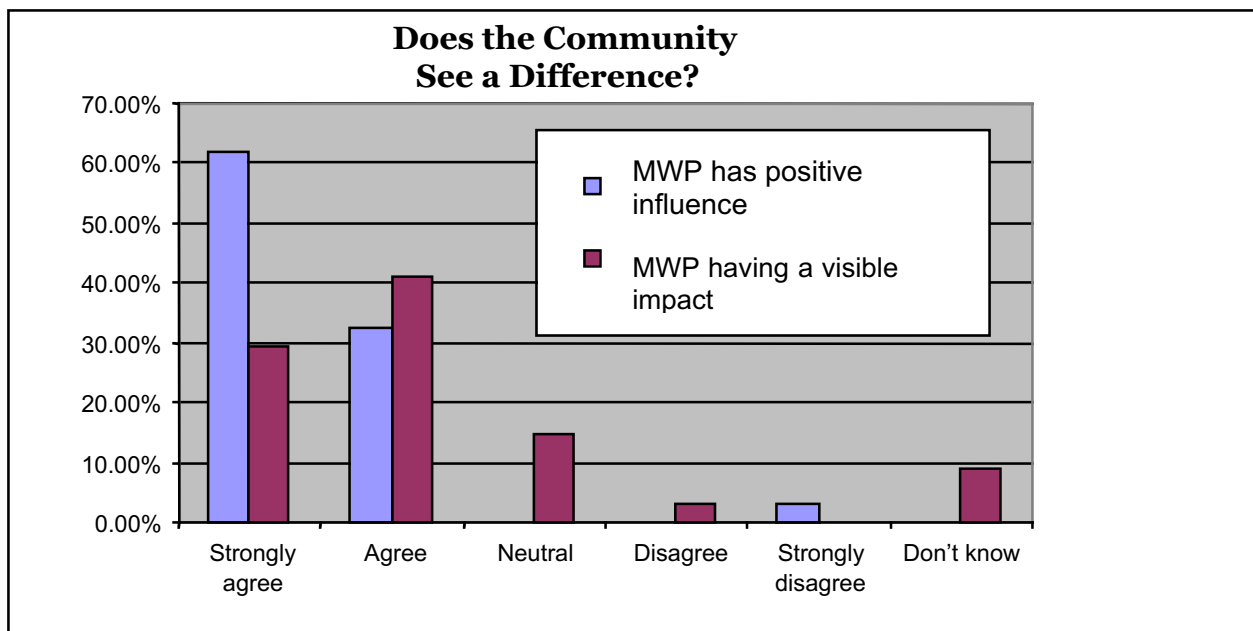
Questions 26-33 sought to quantify levels of involvement in partnership activities and meetings and to identify factors that would stimulate such involvement. It also asked whether the respondents had conducted restoration work on their own property or helped a neighbor with such an effort. Of those who responded, 38% had attended a MWP meeting, while 41% had participated in a partnership work activity (clean-up day or tree-planting project). More than half of the respondents (53%) indicated they had done restoration projects on their own property. Lack of time was cited by 47% of the respondents as the reason they did not become more involved in the MWP activities, while 15% don't want to become involved. Respondents rated restoration projects and the newsletter as the most useful partnership activities, while monthly meetings and building a sense of community were deemed least useful. Collectively, these responses suggests local residents place a high value on restoration projects and a willingness to participate in such efforts.

Graph 2.3



Questions 34-43 asked respondents to rate the performance of the MWP in several areas. Possible responses to these questions were excellent, above average, average, below average, and don't know. The majority (70% or higher) of the respondents rated the partnership's newsletter, education, and project coordinating efforts as above average to excellent. Water quality monitoring and outreach efforts were also well regarded by most respondents. Respondents were less enthusiastic about the partnership's ability to raise money for restoration projects. Only 33% rated these efforts as above average to excellent, while 32% answered, "don't know" to this question. Question 41 asked respondents to agree or disagree that the MWP has an overall "positive influence" in the valley. Sixty-two percent strongly agreed with this statement. Seventy percent agreed or strongly agreed that the partnership is having a "visible impact" in the valley. Overall, the respondents voiced very positive attitudes about the partnership.

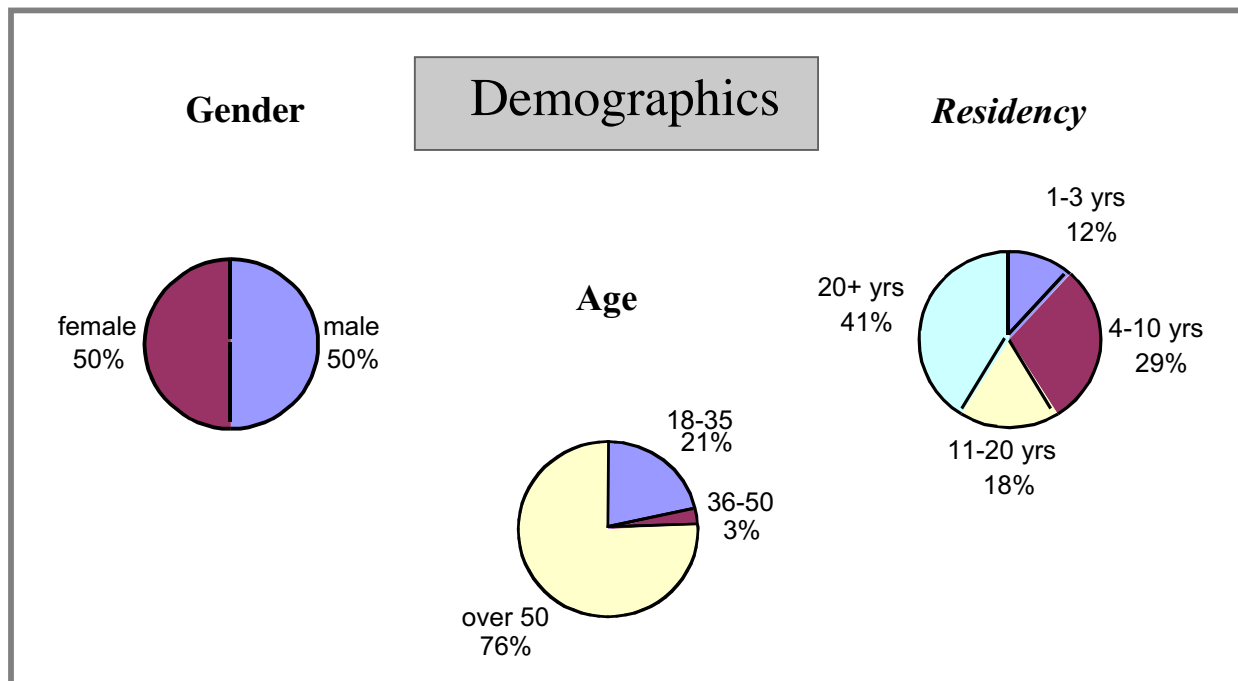
Graph 2.4



Questions #41 and #42 ask respondents to rate the influence and visible impacts the MWP is having in the Mohawk Valley

The final five questions (44-48) recorded some simple demographics about those responding. There was an exact split along gender lines, while an overwhelming majority of respondents (74%) were at least 50 years of age. Eighty-nine percent of the respondents had lived in the valley at least four years and 41% claimed residency of at least 20 years. Of all respondents,

Figure 2.1



68% have a stream either bordering or running through their property and 74% have internet service in their home. There were no responses from persons under 18 years of age or with less than a year of residency in the valley. Finally, a space provided for additional comments elicited responses from 35% of the completed surveys.

Further Analysis

The survey was designed in sub-sections that grouped like-minded questions. This was done to make analysis easier. However, a few questions required more in-depth analysis and the comparison of individual responses to multiple questions. As mentioned above, the FileMaker Pro database software allowed the Service Learning Program team to generate queries along these lines. We created queries designed to determine how concern about watershed issues translates into knowledge about the partnership and willingness to take action. We also looked at how proximity to a stream translates into concern about watershed issues and how commitment relates to action in the restoration effort.

The first query we created identified all respondents who correctly answered questions 12-25, which assessed their understanding of the MWP. These 12 records were then queried to see

how the respondents rated themselves in terms of level of concern in question 10. All but one of the respondents (92%) said they had a “high” or “very high” level of concern about water quality in the Mohawk Valley. These findings suggest that those who are better informed about the MWP are also more concerned with water quality or vice versa.

The second query addressed all responses that identified a “very high” level of concern about water quality (12 of 34) to find out if that concern produced meeting attendance. Eight of the 12 (75%) had attended at least one MWP meeting. These results suggest that those who feel a high level of concern are likely to invest the time to attend MWP functions. Eleven of the 12 named lack of “time” as the thing that kept them from becoming more involved (question 29).

It is important to note that the overwhelming majority of respondents have very positive feelings about the MWP.

Living in close proximity to a stream appears to impact the level of “concern” about water quality issues expressed by respondents. Of the 12 respondents who rated their concern as “very high”, 10 (83%) indicated that a stream passed through or bordered their property. Eighteen of the 27 (66%) respondents who had streams on or bordering their properties rated their level of concern about water quality as “high” or “very high”.

Survey Conclusions

Despite the small sample size of completed surveys, we feel that there is quality data that can be mined from these results. It is important to note that the overwhelming majority of respondents have very positive feelings about the MWP, their activities, their impact in the community, and their ability to produce actions that are creating “visible” results in the valley. These responses were not dependent on a certain level of involvement with the MWP and in many cases came from respondents who had no personal interest in getting involved. Based on these responses, it also appears that local residents have at least a basic understanding of what a watershed council/partnership does and the issues that must be addressed in order to improve stream and watershed health. Most importantly, it appears that restoration projects and enhancement work are the most likely activities to increase community involvement and action. Ultimately, the

success of Mohawk watershed enhancement efforts will depend on the ability of the MWP to get local residents out working on their own properties or community-based projects.

Recommendations

Both the Service Learning Program team and the MWP board had major concerns about the unexpectedly low return rate of completed surveys. Despite the low return, this survey represents an opportunity to learn from it and make improvements for the future. Since many factors contribute to the success of a survey, many suggestions can be made to improve future success. One suggestion is to make the survey more convenient to return. It is possible that the survey return boxes placed at the Tomahawk Restaurant and Mohawk General Store were an inconvenience to most people. Similarly, the option of mailing the survey may have represented a cost and effort that dissuaded many from returning it. Suggestions to increase the convenience of returning a future survey would be to increase the number of drop boxes by placing them in more diverse and convenient locations. A second approach would eliminate the drop boxes in favor of a return postage envelope that would be included with the survey. However, this second option would represent an increased cost to the MWP should they do it.

Despite the low return, this survey represents an opportunity to learn from it and make improvements for the future.

The survey itself may have been too overwhelming and intimidating to some. The number of questions in the survey (50) could be shortened in the future. This runs the risk of producing less information, so the MWP would have to reconsider what information they want to get out of the survey. In other words, if the survey is to be shortened, the MWP will have to narrow the focus. This could mean fewer questions about the value of restoration for example, but continued focus on people's attitudes towards water quality. In addition, the relatively large physical size of the survey and the number of pages (4) may have made the survey seem longer than it was, discouraging some from taking the time to complete it. In the future, the survey could be produced in a smaller, more compact format.

Other possibilities to explain the poor survey response may include a lack of a significant incentive. In other words, the small bag of popcorn or free soda offered to those who returned

the survey to the designated drop boxes might have been insignificant motivation. Often times, surveys will offer a lottery, with say \$100 going to one lucky respondent. Offering an incentive like this costs money, however, a cash jackpot could easily be replaced with a prize or prizes donated from the community. However, registering each respondent into a lottery requires their personal information, which many people may not want to give.

Additionally, the survey itself and the instructions for return may have been unclear, confusing, and hard to understand. The survey's content and layout may need to be re-reviewed to insure that they are clear and concise. Finally, the poor response may indicate that less people than expected are reading through the newsletter. This last aspect is hard to know and evaluate.

The Service Learning Program has made the suggestion that a future survey could be conducted by sub-basin, corresponding to the current focus of the MWP's sub-basin plan. The survey in this case could be mailed separate from the newsletter, with return postage included, to only the residents living in current sub-basin focus areas. The initial costs of this process would be much lower than a similar survey of the whole valley. Ideally, the survey could be conducted via phone or in-home interviews. Both of these methods would require a dedicated group of volunteers and a major time investment but would ensure a much higher return rate.

It is important to note here that all of the above issues and suggestions are intended as a means for debate, and not as a definitive set of answers.

Chapter Three

Education and Outreach

Introduction

A primary concern of the Mohawk Watershed Partnership (MWP) is to foster awareness of watershed health issues and to generate proactive involvement from the community. To facilitate these goals, the Service Learning Program has worked with the MWP on two specific projects: watershed enhancement and education posters and the Mohawk Watershed Restoration Guide.

Watershed Enhancement and Education Posters

Purpose

The Service Learning Program worked with the MWP to design and create ten educational posters. These posters were designed to raise awareness about watershed health issues and provide local residents with useful information to conduct small-scale restoration projects in their own backyards. The posters can be used as educational tools at MWP monthly meetings and at various community events.

Methodology

The Mohawk Watershed Partnership identified ten issues significant to watershed health. These issues were chosen because of the high priority of each issue and the direct relevance to the Mohawk watershed. The issues chosen are as follows:

- Native Landscaping
- Recognizing and Controlling Invasive Weeds
- Mud and Pasture Management
- Organic Gardening
- Manure Composting
- Small Stream Enhancement
- Western Pond Turtle Habitat Enhancement
- Septic Tank Maintenance
- Streamside Enhancement

➤ Wildlife Habitat Enhancement

Each poster addresses a particular issue by introducing the topic, describing the impacts on the watershed, making suggestions towards improving watershed health, and documenting local experience with each issue. For the latter part, each group member conducted interviews with Mohawk Valley residents who had previous experiences dealing with each particular issue. For example, the “Recognizing and Controlling Invasive Weeds” poster contains an excerpt on a local resident who removed blackberry bushes from her streamside. By including local examples the posters are more persuasive because they provide people the opportunity to learn from their neighbors. Digital copies of the posters can be found in appendix E.

Mohawk Watershed Restoration Guide

Purpose

The Service Learning Program also worked closely with the MWP to create a local guide to restoration projects. The focus of this task was to document and highlight particular restoration projects accomplished by local residents. Similar to the goals of the posters, this restoration guide seeks to address salient watershed health issues through awareness and to spur local support for similar types of restoration projects.

Methodology

The restoration guide includes eleven interviews with local landowners. The MWP supplied the Service Learning Program with a list of Mohawk Valley residents who have completed or were in the process of conducting a restoration project on their land. With this list, the team members were able to contact these individuals and conduct interviews. Each team member documented two restoration projects with the exception of one team member who documented three. Each team member spent time talking with each interviewee to determine the scope, purpose, logistics, and effectiveness of each restoration project. Team members also spent time taking pictures to be included in the final published restoration guide booklet.

A team member also conducted research on grants that are available to help fund restoration projects like the ones documented. This information will serve as a landowner’s guide to

restoration-based grants that are available to private citizens (and organizations like the MWP). Together, these three components – the eleven interviews, pictures, and grant information – combined with a fourth – a map of the Mohawk watershed with approximate locations of each restoration project – were combined into a single published document entitled, “The Mohawk Watershed Restoration Guide.”

A copy of the restoration guide is included in appendix H.

Chapter Four

Water Quality Data

Introduction

Each month since September of 1998, volunteers have participated in collecting water samples at three sites along the Mohawk River. Volunteers include students from Springfield High School, the University of Oregon, Mohawk Valley community members, and members of the Mohawk Watershed Partnership (MWP). The water samples are typically collected on the first Saturday morning of the month and taken back to the Mohawk High School for analysis. The information is collected and then stored in an Excel spreadsheet for further analysis. Parameters tested include turbidity, conductivity, temperature, dissolved oxygen, biochemical oxygen demand, and others. These testing parameters will be discussed in greater detail later on in this chapter.

The Service Learning Program worked with the MWP to manage this data and to provide some preliminary analysis. This chapter outlines the work that the Service Learning Program has done to accomplish this task.

Purpose

The MWP asked the Service Learning Program team to assemble the water quality data into a more accessible and useable format (i.e. organized spreadsheet and graphs) and to provide some preliminary analysis of the data. With this, the MWP can better understand the data and extrapolate meaning from it, with particular emphasis given to trend analysis. By having an efficient and manageable data system, the MWP can better understanding trends in water quality and develop appropriate strategies towards either maintaining or improving water quality.

The Issues

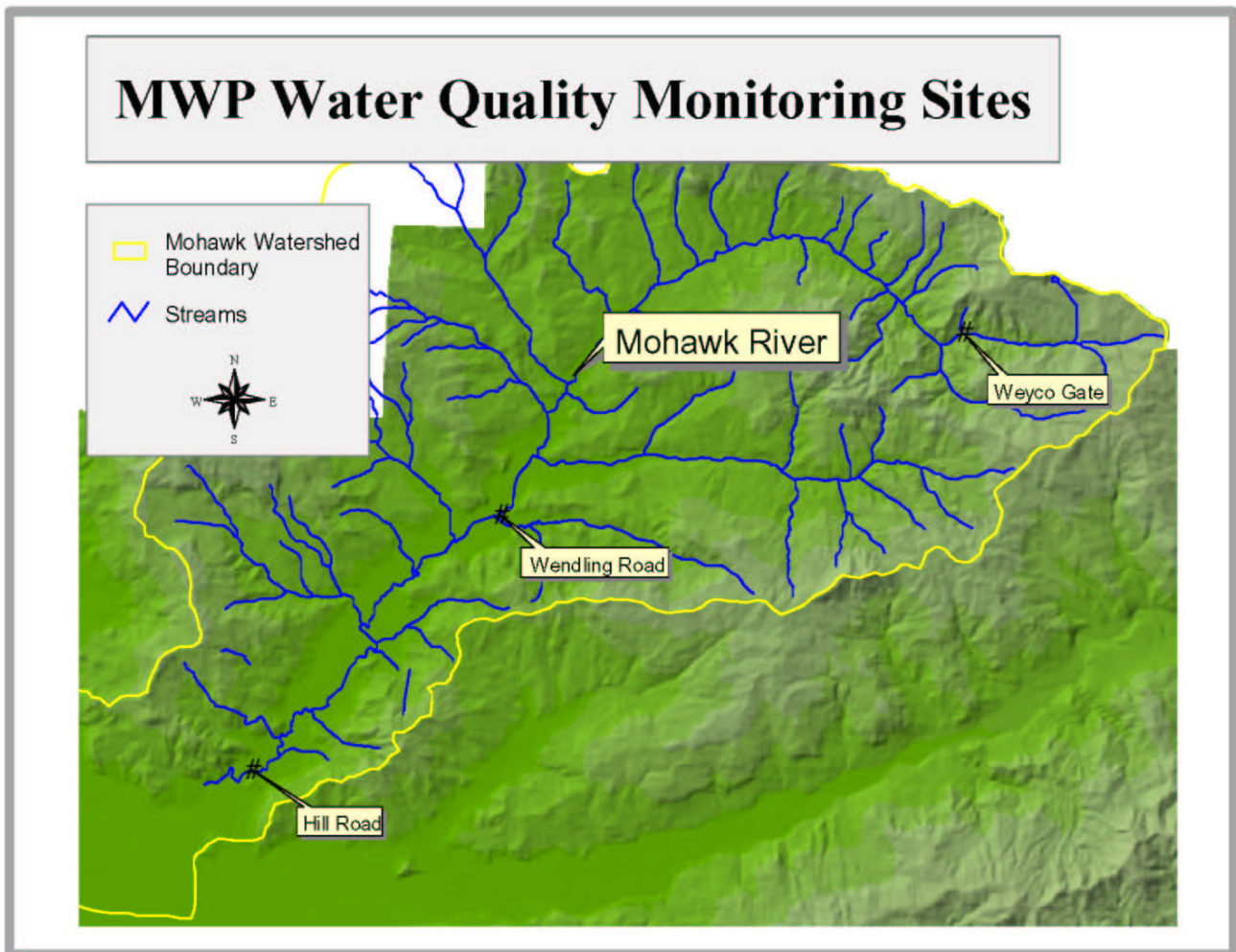
The Mohawk River and Shotgun Creek are on the 303(d) list for water quality violations. The 303(d) list is a by-product of the Clean Water Act. Each state is required to perform water quality analyses for their streams. Those that don't conform to water quality standards are required to be listed as degraded streams under stipulation 303(d). The Mohawk River is considered out of

regulation for temperature (between stream-miles 0 – 25) and dissolved oxygen. Shotgun Creek is also listed as out of regulation for temperature.

Methodology

The Service Learning Program was provided with the MWP’s existing water quality database. A Service Learning Program team member took this information, which contained testing station id, longitude and latitude coordinates, parameters tested, river mile, and the person responsible for that testing, and created an easy-to-read sheet with just the vital data for water quality analysis. Next, that team member created a number of charts **** (see chart analysis, p.?) ****, some with single y-axis and some with double y-axis. A double y-axis allows two or three different data sets on the same chart, making multi-parameter analysis and comparison much easier.

Map 4.1



Water Quality Testing Site Map

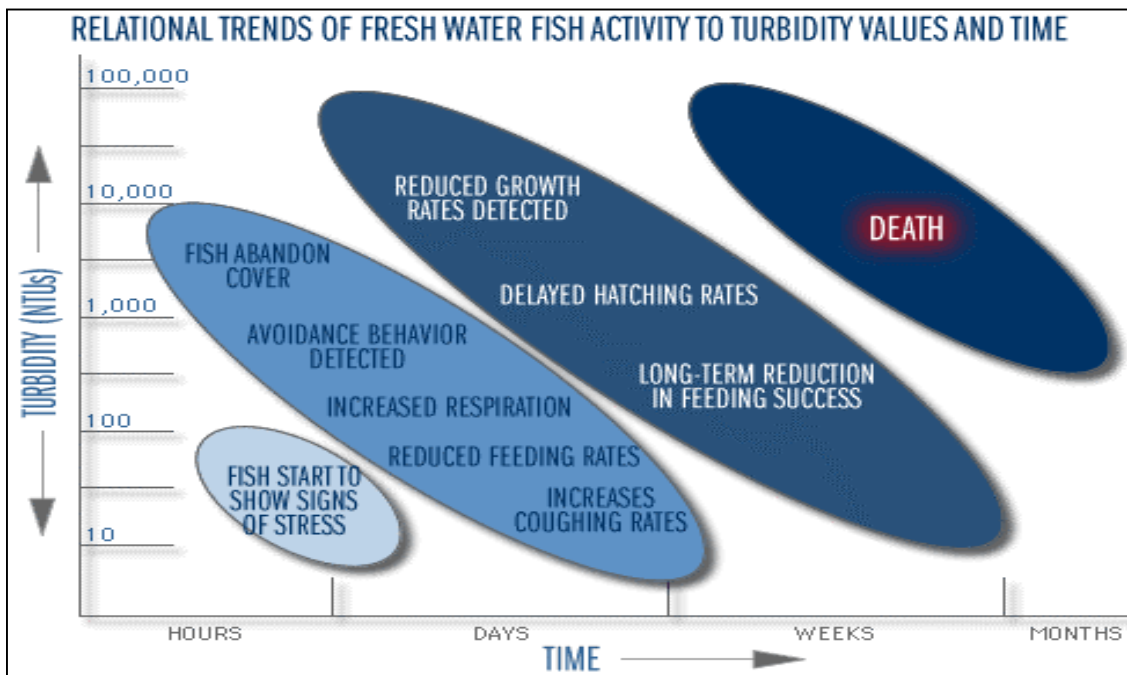
The three sites where water samples are collected can be seen on the map above. Hill Road is the testing site closest to the mouth of the Mohawk at river mile 1.6, Wendling Road is the second up river at river mile 11.3, and Weyco is the furthest up stream.

Water Quality Parameters

Turbidity

Turbidity refers to the clarity of the water, commonly measured by the ability of light to pass through a water column. When a significant amount of solid particles are suspended in water, it appears cloudier and thus more turbid. Measuring turbidity is important to stream health because it can potentially impact living organisms and their eggs (in the case of fish and amphibians). As silt, clay, and organic matter settle in streambeds, eggs can be suffocated. Aquatic habitats can also fill with sediments and damage the gill structures of fish. This process can choke the fish, weaken it, and reduce its resistance to disease.

Figure 4.1



Source: "Turbidity: A Water Quality Measure", Water Action Volunteers, Monitoring Fact sheet Series, UW-Extension, Environmental Resources Center. It is a generic, un-calibrated impact assessment model based on Newcombe, C. P., and J. O. T. Jensen. 1996. Channel suspended sediment and fisheries: a synthesis for quantitative assessment of risk and impact. North American Journal of Fisheries Management. 16: 693-727.

High turbidity also reduces the amount of light penetrating the water. The lack of light scattered through the water reduces photosynthesis in aquatic plants and prevents the release of oxygen into the water during the daytime. Oxygen levels are important in maintaining fish population and other essential organisms.

Dissolved Oxygen

Dissolved Oxygen (DO) refers to the amount of oxygen contained in water. DO is important to aquatic organisms because they require a particular amount of DO to live. Therefore, a stream must have an adequate amount of DO to be considered healthy. The lower the amount of DO available in the water, the greater the stress that is caused to any aquatic species. The Oregon Department of Environmental Quality (ODEQ) recognizes minimal allowances of DO depending on the season. During summer (June 1 – August 31), the minimum is 8mg/L or 90% saturation. For the rest of the year the value remains at 11 mg/L. It is important to keep these values in mind when analyzing the graphs

DO levels naturally fluctuate throughout the day due to photosynthesis. This fluctuation is known as the diurnal oxygen cycle. It increases during the daylight hours when photosynthesis occurs and decreases at night when respiration continues and photosynthesis does not.

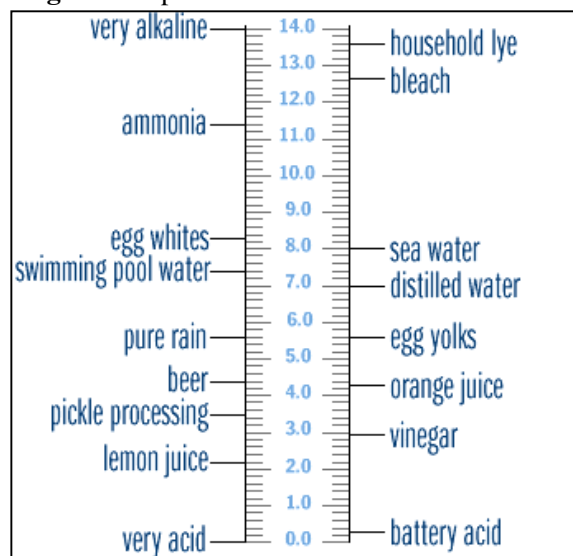
Water Temperature and Dissolved Oxygen

Warm water is less capable of holding oxygen gas in solution than cool water. For example, water that is 90 degrees Fahrenheit can only hold 7.4 mg/L of dissolved oxygen at maximum saturation. In comparison, water at 45 degrees Fahrenheit can hold 11.9 mg/L of dissolved oxygen at maximum saturation. Thus, the higher the temperature, the lower the amount of dissolved oxygen available in the water. Conversely, the lower the temperature the greater the amount of dissolved oxygen in the water. Additionally, areas with higher water temperatures cause aquatic animals to increase their metabolic rates. This increase in metabolic rates increases the organism's physiological demand for oxygen, thereby reducing dissolved oxygen in the stream. The ODEQ recommends stream temperatures to not exceed 17.8 degrees Celsius (64 degrees Fahrenheit).

pH

pH measures the acidity or alkalinity of a solution. Acidity and alkalinity are chemically represented by the amount of hydrogen ions present. At higher pH levels there are less free hydrogen ions. A change of one pH unit is actually a tenfold change in the concentration of hydrogen ions. The pH scale ranges from 0-14 with 7 constituting neutral. Measurements less than 7 are considered acidic and greater than 7 are basic (alkaline). Even small changes in pH can threaten aquatic life. The ODEQ recommends a pH between 6.5 and 8.5.

Figure 4.2: pH scale



Source: "Water on the Web"
<http://wow.nrri.umn.edu/wow/> 2003.

Stream flow

Stream flow is measured as discharge per cubic foot per second, as is standard for the United States Geologic Survey (USGS), which monitors stream flow for nearly all major streams and rivers in the United States, including the Mohawk River.

Stream flow is particularly important for physical and biological reasons. During times of high stream flow, benefits include ease of migratory fish passage, increased competence (the ability to move bed load), floodplain rejuvenation, and habitat creation. Stream flow is also a critical factor in relation to waste disposal. During times of high stream flow, pollutants and bacteria occurring in the Mohawk River will be more diluted and less harmful than times when stream flow is low. It can be assumed then, that risks from pollution and bacteria will be highest in the summer months when stream flow is typically low and lowest in the winter when stream flow is typically high.

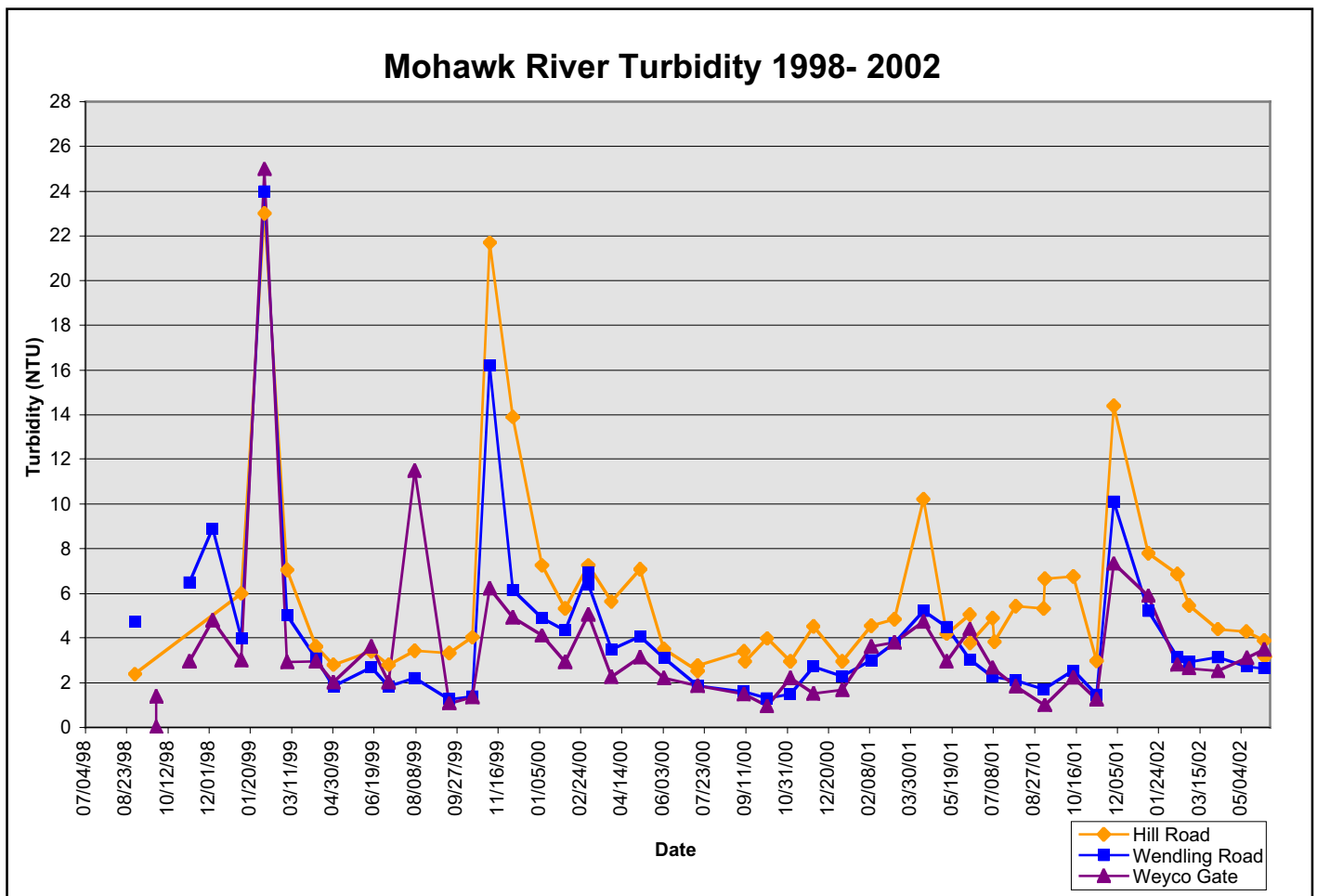
Analysis

Turbidity in the Mohawk River

Turbidity in the Mohawk River is measured at all three water quality testing sites. The turbidity levels of all three sites are contained in the graph below. Over the three-year monitoring span, turbidity levels have been decreasing in the winter months and remaining fairly consistent in the summer months. The peaks in turbidity levels are correlated with high streamflow rates as seen in the following chart on **p ?**.

The Hill Road location is the farthest downstream at river mile 1.6 and generally has higher turbidity levels. As the water velocity increases downstream, it picks up more sediment and solid matter, thus attributing to greater turbidity levels. Therefore, turbidity levels should be higher at

Graph 4.1



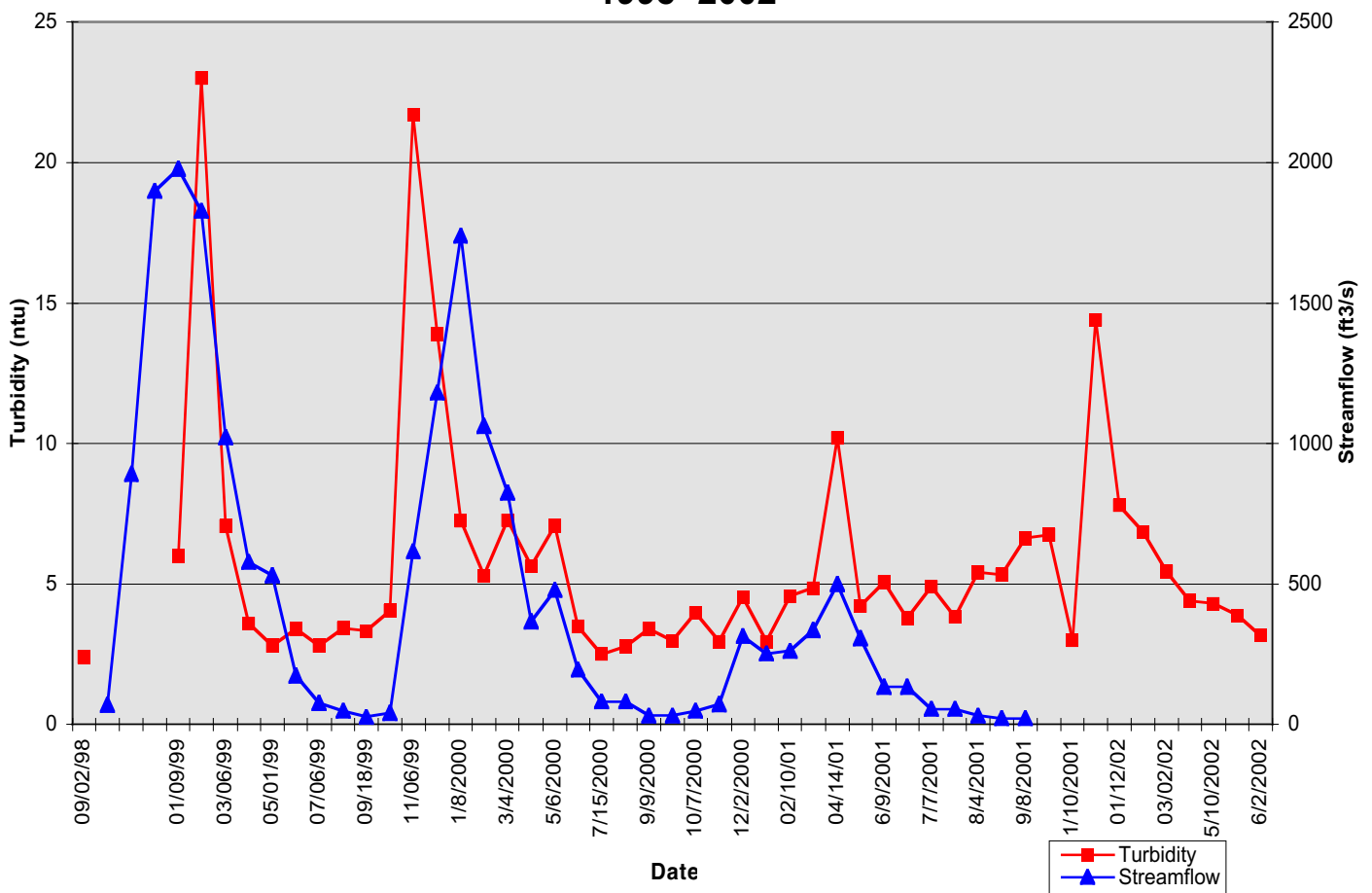
the Hill Road location, followed by decreases at Wendling Road and Weyco gate. This is usually the case in the graph below except for the data points on 2/6/1999 and 8/6/1999. The first

date correlates with the first peak on the chart. For this date, all three values are relatively close, however, Weyco gate, followed by Wendling Road, have the highest turbidity levels. This means that turbidity levels were higher upstream then downstream. Then, on 8/6/1999, there was a peak at Weyco Gate that does not correlate to the other two sites. Both of these anomalies could be attributed to a mistake or error in the measuring process or could be a result of abnormal activity (logging, construction, culvert replacement) occurring upstream that added sediment to the water.

Turbidity and Mean Monthly Stream flow at Hill Road

Stream flow varies seasonally and is closely related to turbidity. During the winter months, when precipitation is highest, turbidity levels are also high. This is attributed to both the increase of

**Graph 4.2: Turbidity and Mean Monthly Streamflow at Hill Road
1998- 2002**



water velocity that results from higher stream flow, and higher stream flow itself. High water

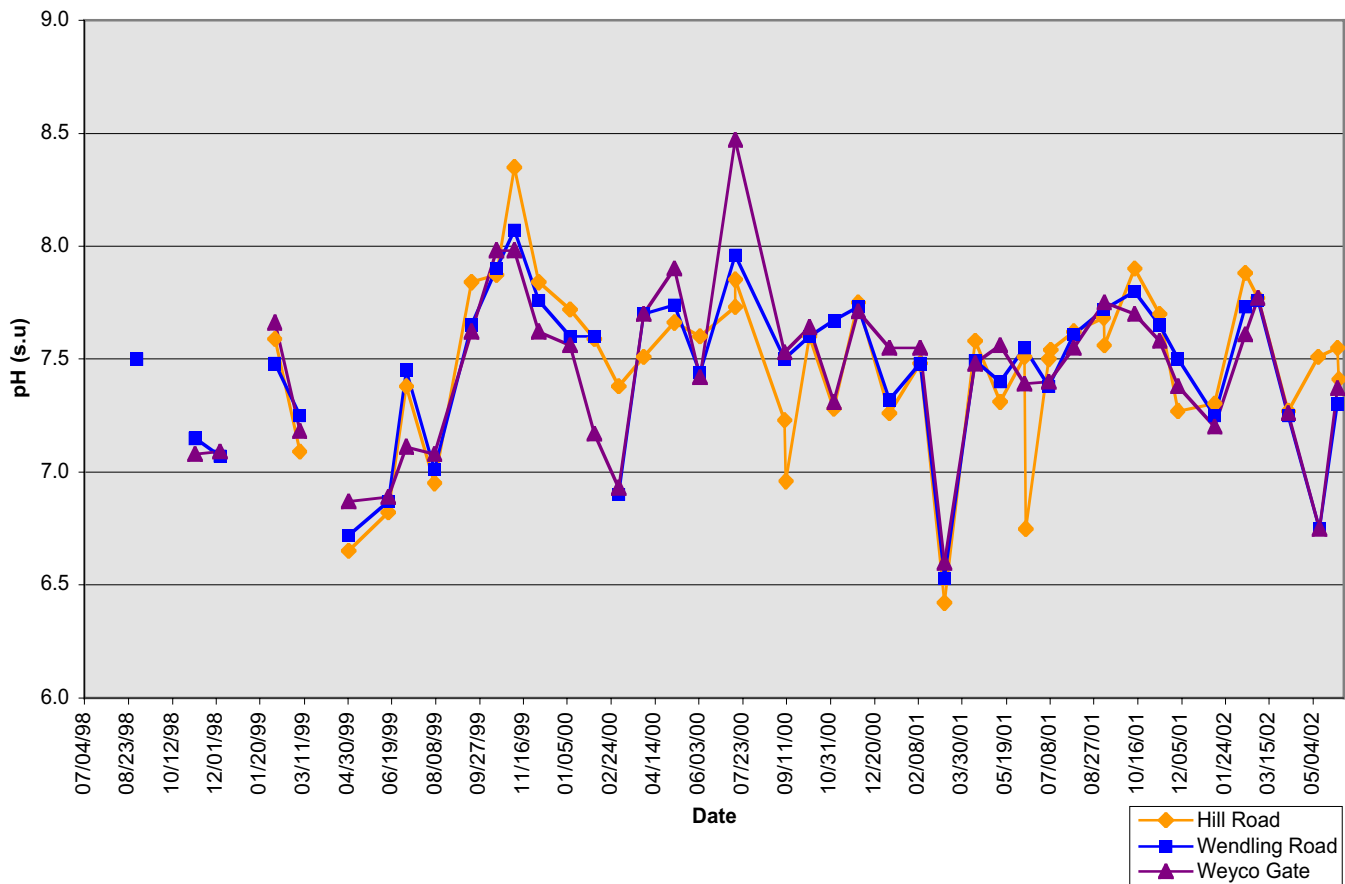
velocity and stream flow increases the amount of sediment being picked up and carried in the river, thus elevating turbidity levels. As the water levels decrease in the summer months, solid particles settle and the turbidity levels decrease.

From 1998-2002, the flow rates decreased annually because rainfall decreased each year. Stream flow statistics for the Mohawk River were not available from 9/8/01 through 6/2/02. Therefore, it is difficult to know if flow rates were returning to previous levels. Turbidity levels increased from 2001-2002 leading one to believe that flow rates also increased during this time.

pH levels in the Mohawk River

Considering the pH scale runs from 0-14, there is relatively little change in the pH levels of the Mohawk River. However, please be reminded that the pH scale is logarithmic, meaning that an

Graph 4.3: Mohawk River pH 1998- 2002



increase of 1, say from 7 to 8, actually represents a tenfold increase. Also bear in mind that aquatic life is very sensitive to what may seem as a relatively small change in pH.

In the chart below, the pH scale runs from 6 to 9 instead of 0-14. This was done to better emphasize the small changes in pH. It is apparent in the chart that there have been a few minor peaks and drops in pH levels over the three-year span. These changes could be attributed to a variety of factors. One factor is that pH levels increase when there are higher levels of algae and plant growth in the water. This growth occurs with higher water temperatures and excess nutrients. Typically the three sites change pH levels together but there are a couple of discrepancies on 9/10/2000, 6/10/2001, and 5/10/2002. The first two dates show lower pH levels at the Hill Road site that is not reflected at the other two sites. The last date shows a higher pH level at Hill Road when the other two sites are nearly identical.

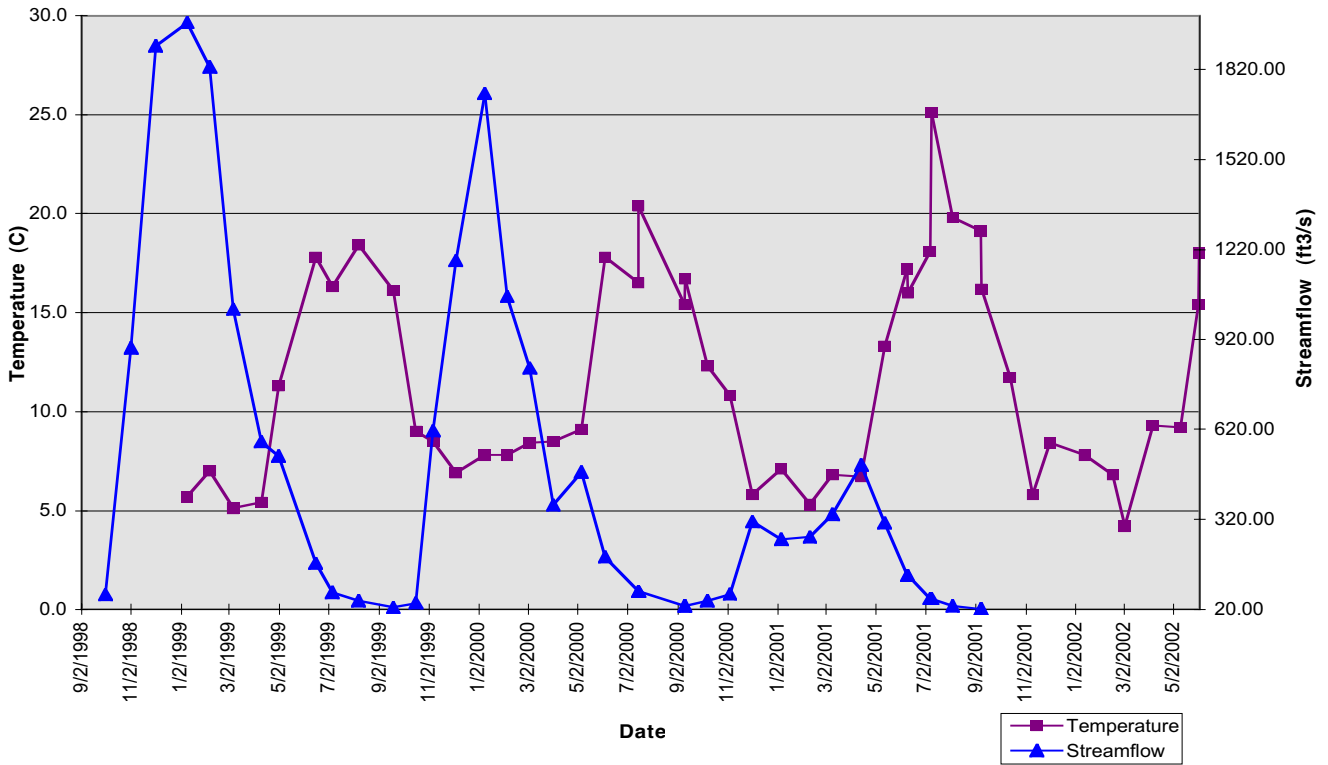
Water Temperature and Mean Monthly Stream flow at Hill Road

Stream flow in the Mohawk River varies seasonally and is highly dependent on rainfall amounts. There are no dams in the Mohawk Valley that otherwise alter or moderate this seasonal variance in stream flow. Therefore, it is assumed that stream flow in the Mohawk River will be highest during the winter rainy months and lowest during the dry summer months. Looking at the graph, this is quite apparent. Periods of high stream flow generally occur between November and April. The winter of 2000-2001, however, stream flow was quite lower than the two previous years but still remains the highest period of stream flow during that year.

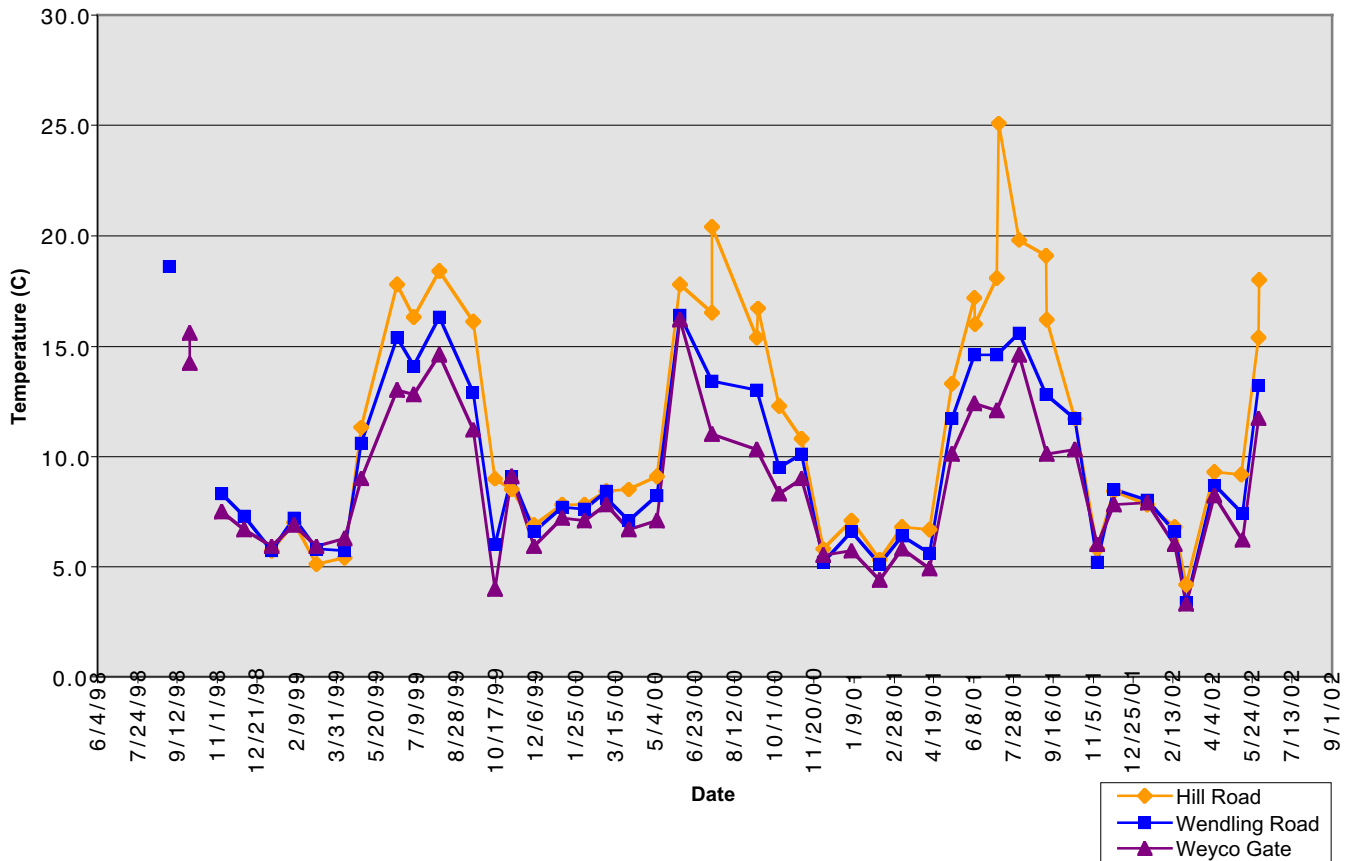
Likewise, water temperature varies seasonally and, because there are no dams or warm/cold water discharges into the river that would otherwise alter water temperature, should be highest in the summer and lowest in the winter. Again, the graph portrays this. As expected, water temperatures are generally lowest between December and April. Meanwhile, warm temperatures are highest between the months of June and September.

Graph 4.4

Temperature and Mean Monthly Streamflow at Hill Road 1998



Graph 4.5: Mohawk River Temperature 1998- 2002



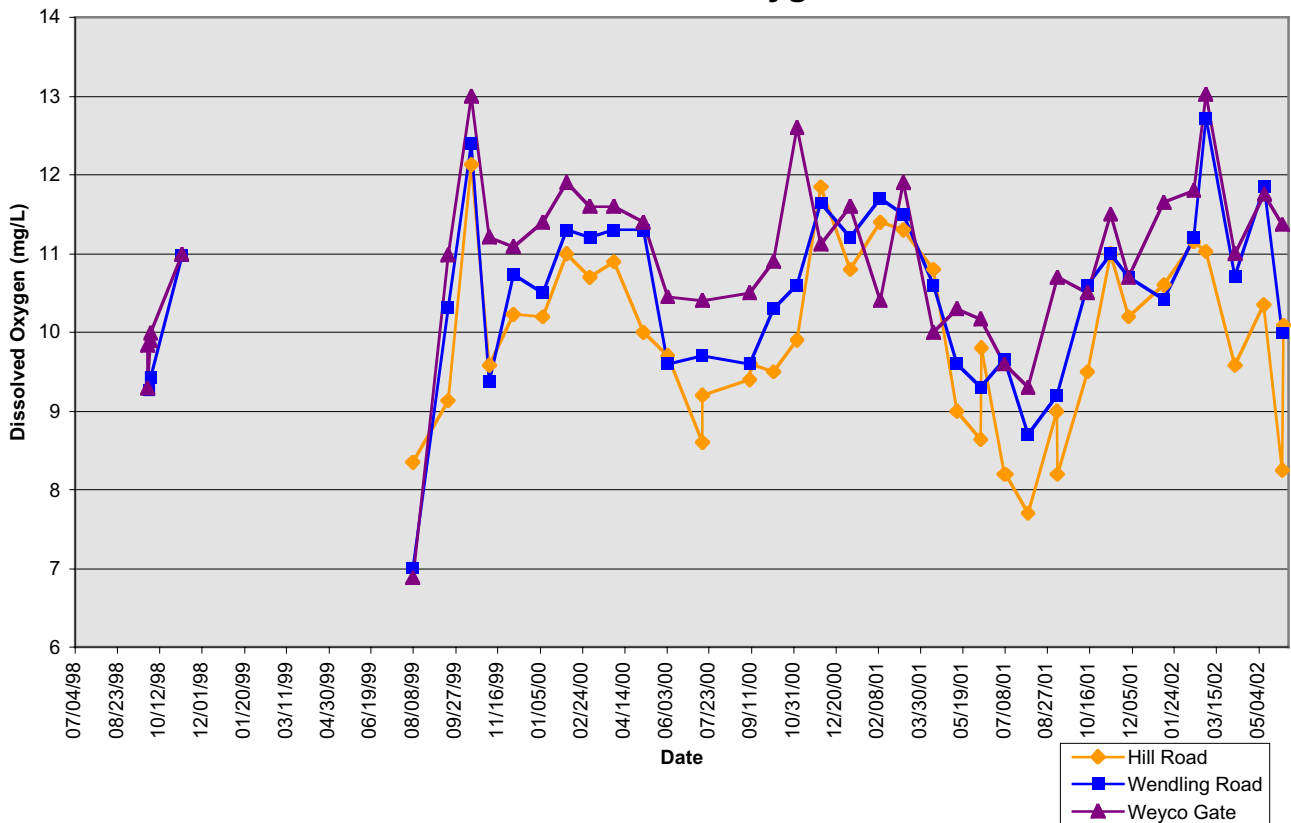
Mohawk River Water Temperature over Time

Temperatures seasonally fluctuate in the Mohawk River. During the summer months, water temperatures are higher than during the winter months. The water temperature at Hill Road is generally warmer than the other sites. Weyco tends to have the coldest temperature, which coincides with the fact that it is higher up in the watershed (closer to the mountains). Throughout October of 1998-May 2000, the temperature only varies a few degrees from site to site. However, during the summer of 2000 and 2001, the temperature between the sites varies a great deal, peaking with a 12-degree difference between Weyco Gate and Hill Road during the summer of 2000 (see graph 4.5 on previous page).

Dissolved Oxygen in the Mohawk River

Dissolved oxygen levels in the Mohawk River vary over the three-year span and range between 7 mg/L and 13 mg/L. If DO levels in the water drop below 5 mg/L, aquatic life is put under stress, and if it reaches below 1-2 mg/L for a few hours, it can kill large fish. Dissolved oxygen levels tend to be the lowest at Hill Road, which concurs with the fact that water temperature is usually

Graph 4.6: Mohawk River Dissolved Oxygen 1998- 2002



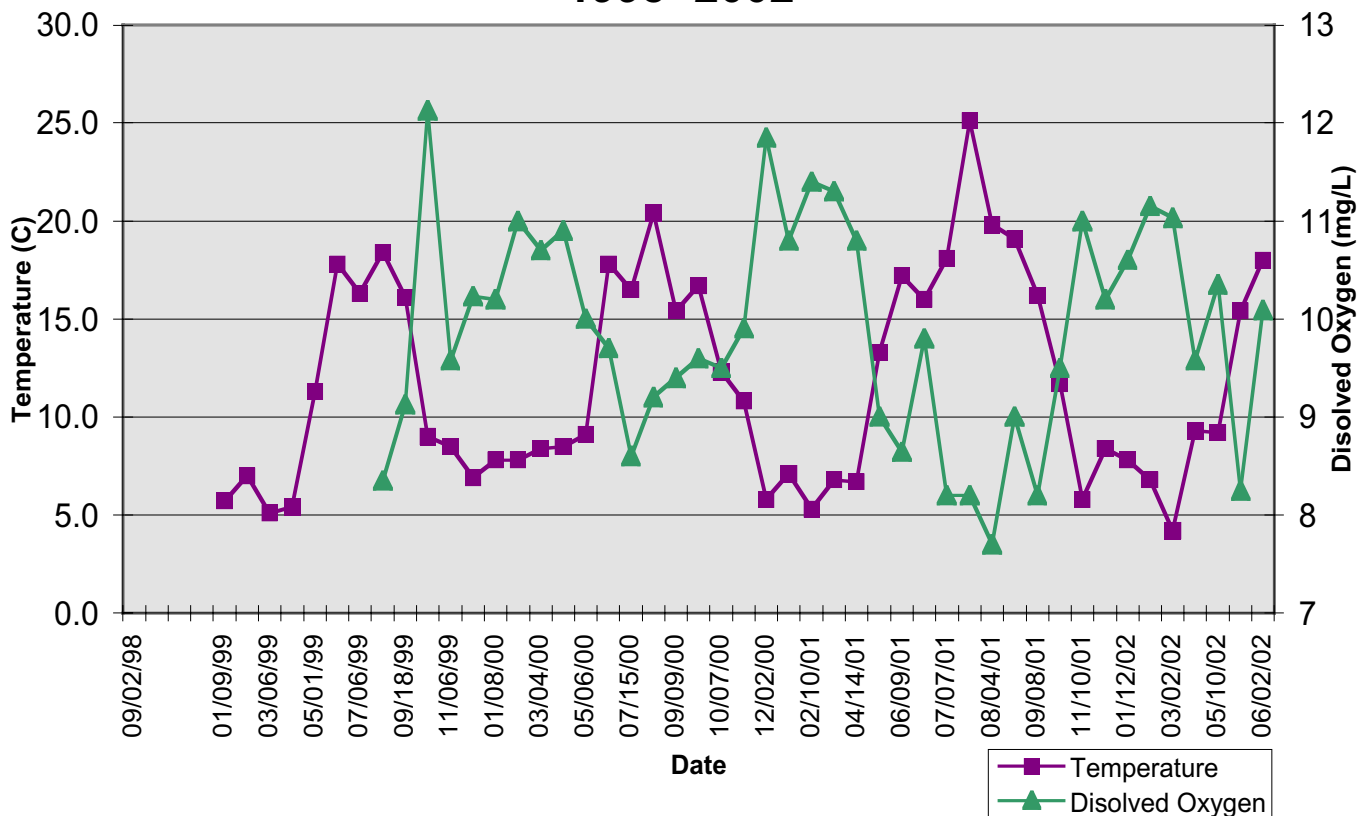
the warmest there when compared to the other two testing sites. At Weyco gate, dissolved oxygen levels have the highest variation between each of the samples. Dissolved oxygen levels at Weyco gate are often the highest of the three sites, which also concurs with the fact that it tends to have the coolest water temperatures. Dissolved oxygen levels at Wendling Road tend to lie between those of Hill Road and Weyco gate.

Water Temperature and Dissolved Oxygen at Hill Road

Water temperature and dissolved oxygen are inversely correlated. The higher the water temperature is, the lower the amount of dissolved oxygen in the water. On the other hand, the lower the water temperature is, the more dissolved oxygen in the water. Since water temperature varies seasonally, dissolved oxygen levels are lower in the summer months than during the winter months. This pattern is shown in the graph below.

Graph 4.7

Temperature and Dissolved Oxygen at Hill Road 1998- 2002



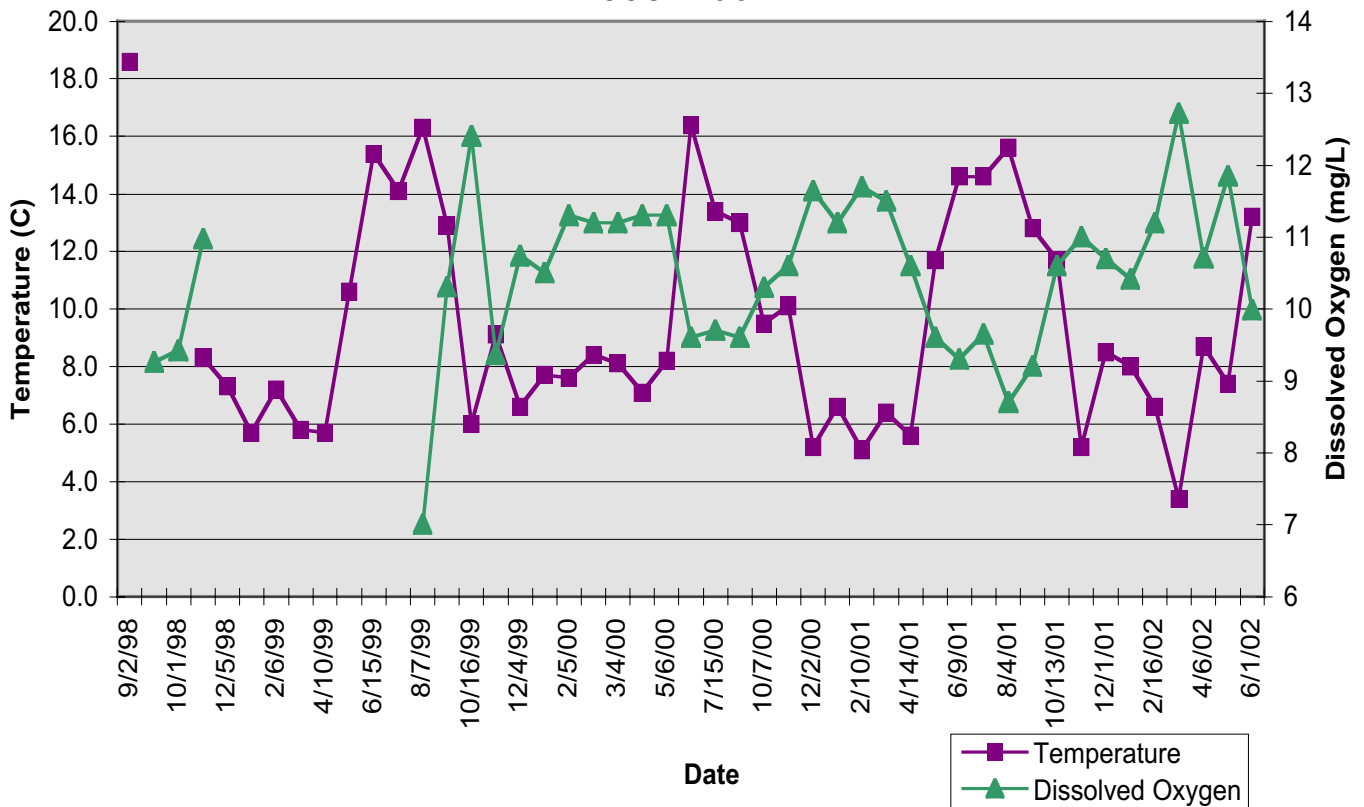
One anomaly exists in October of 1999, where the graph shows that the dissolved oxygen levels dramatically increase to 12 mg/L. The dissolved oxygen level is particularly high compared to other months where the temperature is similar.

Water Temperature and Dissolved Oxygen at Wendling Road

At Wendling Road, the dissolved oxygen levels are generally never below 5 mg/L. Again, the dissolved oxygen levels and water temperature continue to vary seasonally. In May or June of each year, a dramatic increase of temperature causes dissolved oxygen levels to decrease. In October of 1999, the dissolved oxygen level is very high, as we saw in the last graph.

Graph 4.8

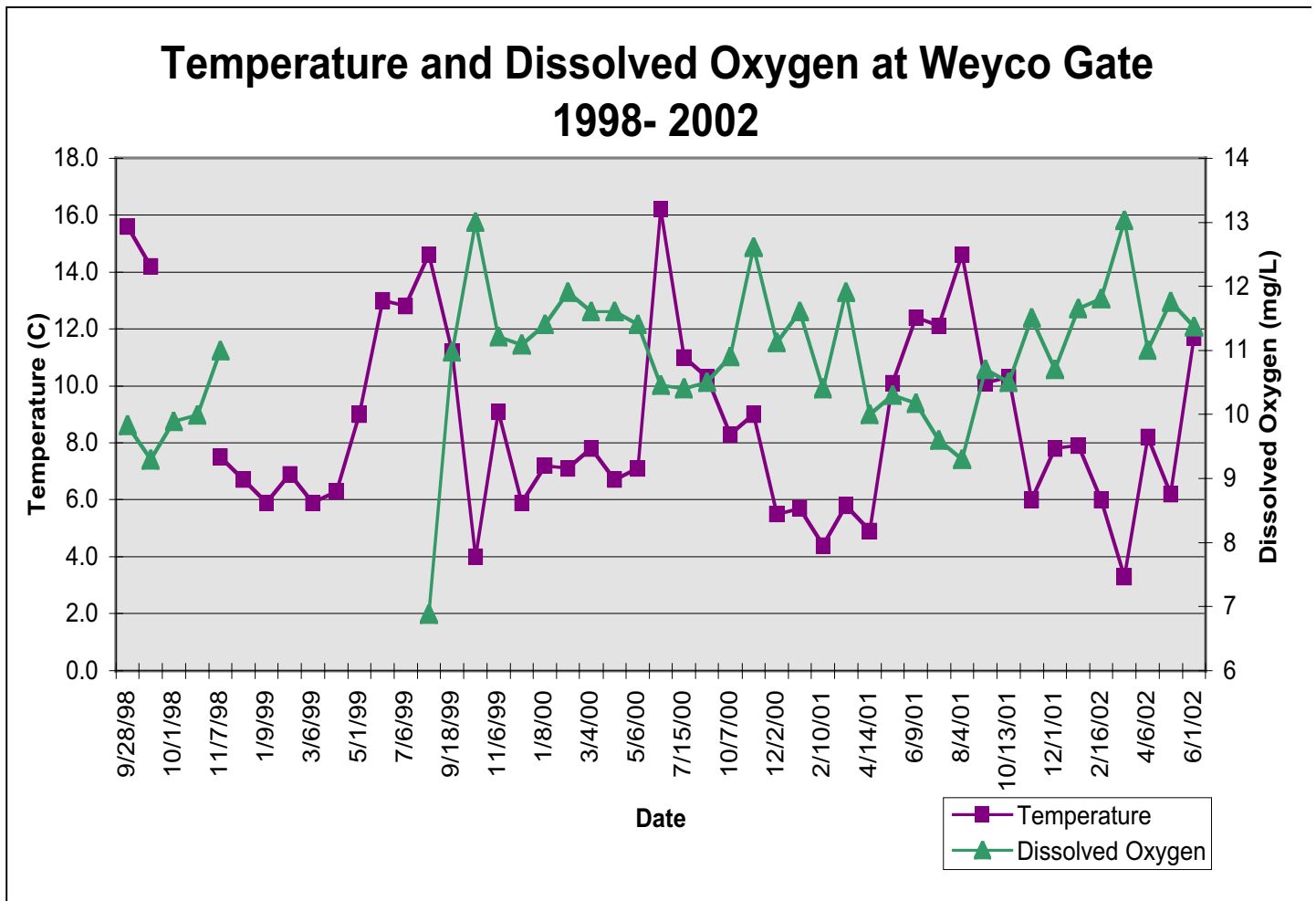
Temperature and Dissolved Oxygen at Wendling Road 1998- 2002



Water Temperature and Dissolved Oxygen at Weyco Gate

Water temperature and dissolved oxygen still show seasonal variance at Weyco gate. However, the variation is more dramatic at Weyco gate than at Wendling or Hill Road. Once again, we have very high dissolved oxygen levels in October of 1999. The water temperature at that point is 4 degrees Celsius, the second lowest temperature in the sample, with dissolved oxygen levels reaching almost 13 mg/L. The previous month the temperature was about 11 degrees Celsius and dissolved oxygen levels were about 11 mg/L. Sometimes it is difficult for fish to adjust to large changes in water temperature and dissolved oxygen levels because the changes put them under stress. However, it is important to remember that DO levels do fluctuate daily. The difference in dissolved oxygen levels in October of 1999, 2000, and 2001 could be due to human error or even due to measurements taken at different times during the day.

Graph 4.9



South Santiam Watershed Comparison

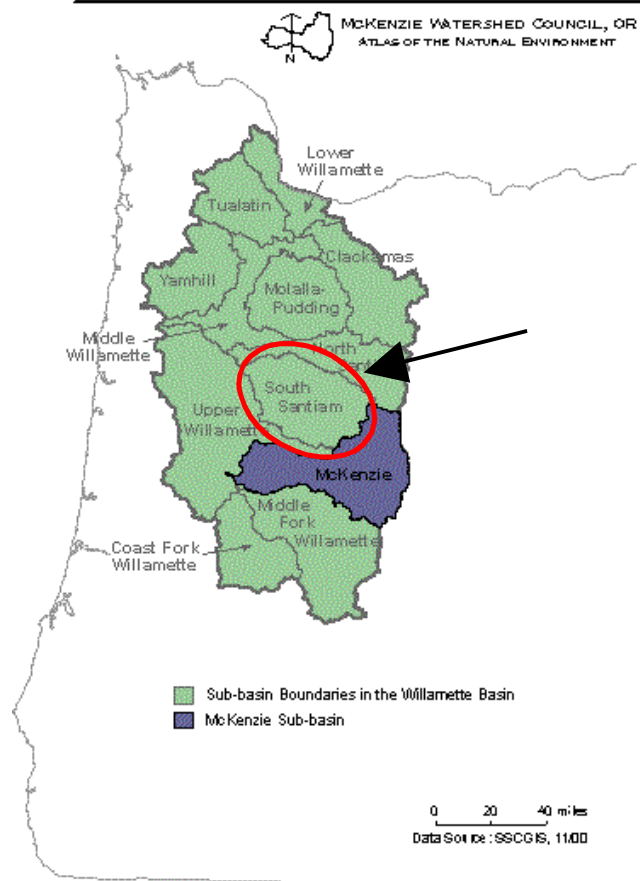
To put the Mohawk River water quality data in perspective, the Service Learning Program team compared a small amount of data with similar data from the South Santiam watershed.

The South Santiam watershed is located within the Willamette basin (*see map 4.2*) and surrounds the communities of Lebanon, Scio, and Sweet Home. This particular watershed was chosen because of its similar range of elevations, rural character, and similar position in the Willamette basin. The South Santiam watershed, like the Mohawk watershed, provides many recreational opportunities because of its large tracts of open land and small population.

The South Santiam Water Quality Monitoring Program has been testing water quality at nine sites in the South Santiam Watershed since May 1997. The program relies upon volunteers from Scio High School, Lebanon High School, Sweet Home Junior High School, and the community to monitor local streams.

The two graphs from the South Santiam watershed are from Hamilton Creek, a tributary of the Santiam River. These graphs show both temperature and dissolved oxygen at two sites, Berlin Road (figure 4.3) and Bellinger Scale Road (figure 4.4). The latter site is one mile upstream from the former site.

Map 4.2
Willamette Basin and Sub-basins



Source: McKenzie Watershed Council Website, 2003
http://www.mckenziewatershedcouncil.org/mckenzieatlas/images/basin_map.gif

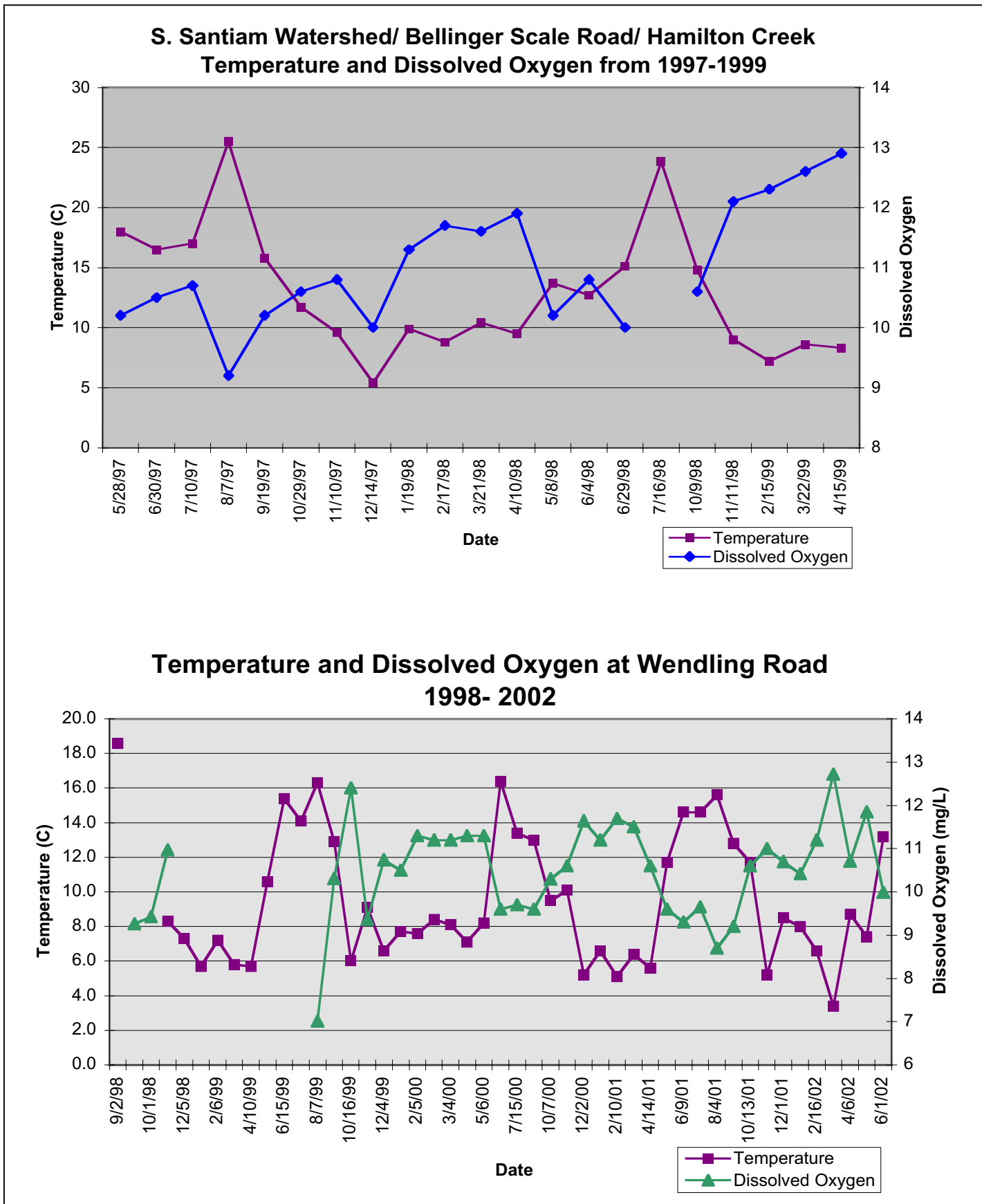
These graphs were compared with two similar graphs from the Mohawk River.

The stream comparison analysis shows similar seasonal trends between the Mohawk River and Hamilton Creek. The first comparison, figure 4.3, shows Hamilton Creek dissolved oxygen levels to range between 9 and 12.9 mg/L. Readings from the Mohawk River range between 7.8 and 12.2 mg/L. Dissolved oxygen comparisons in the second comparison, figure 4.4, are similar to figure 4.3.

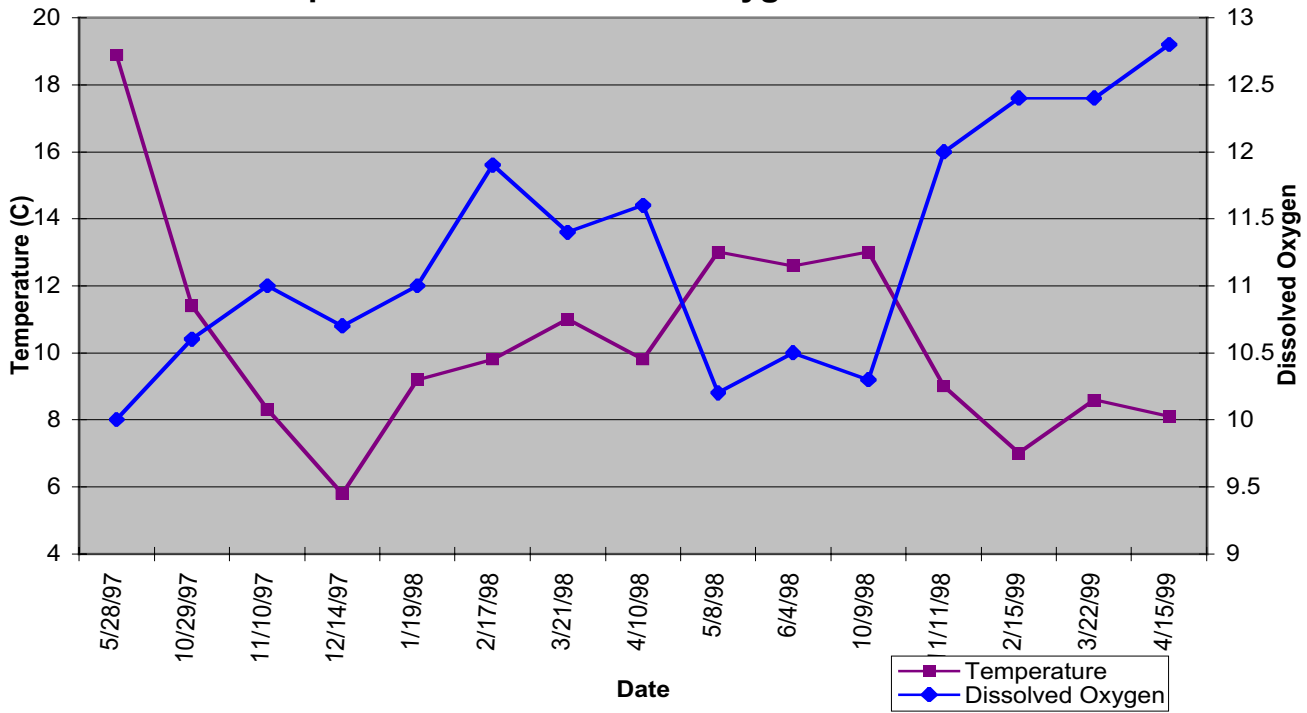
Stream temperature values between both sets of comparisons are similar and reflect the typical seasonal variance of the Willamette Valley.

This stream analysis, although limited in its scope, helps put the water quality data in context. What can be learned from the above analysis is that the Mohawk River appears to be normal considering its geography and the level of human presence. This analysis was not intended to provide the MWP with a complete analysis but rather a starting point for further comparison and analysis.

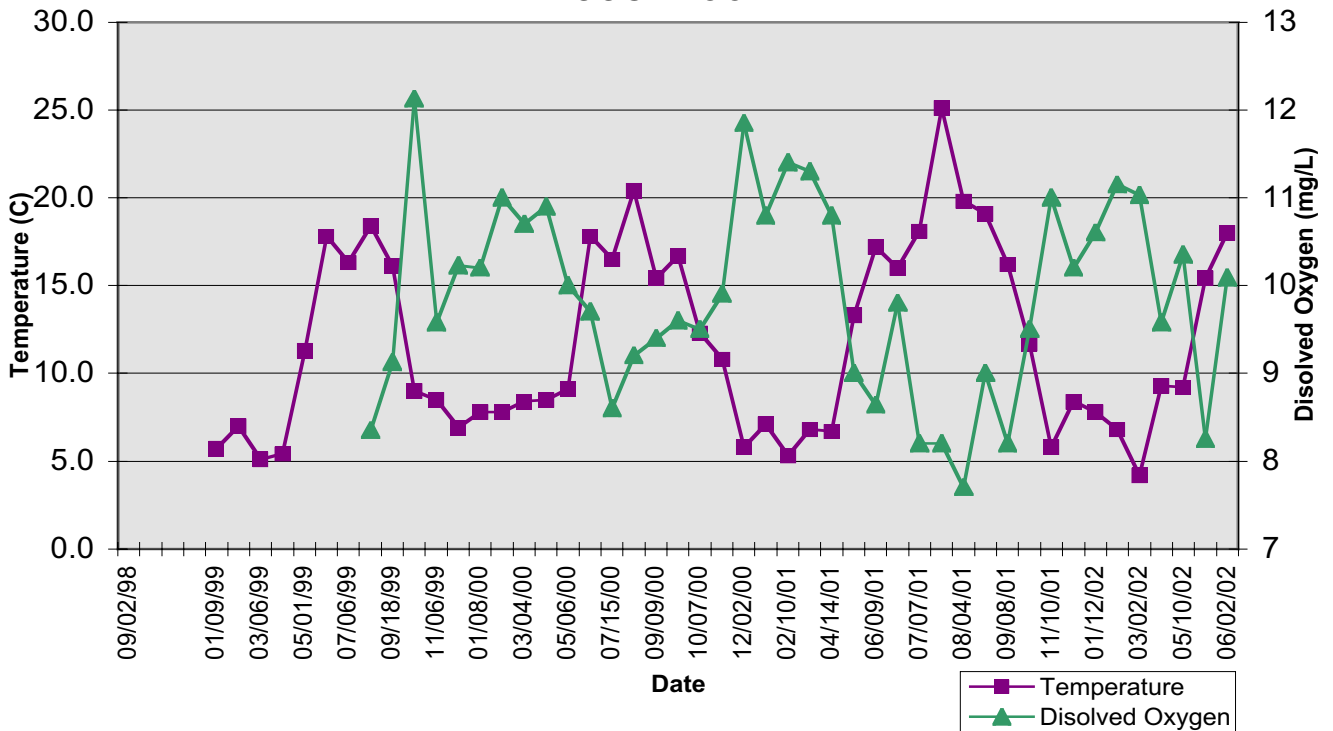
Figure 4.3: Stream Comparison number 1



S. Santiam Watershed/ Berlin Road/ Hamilton Creek Temperature and Dissolved Oxygen from 1997-1999



Temperature and Dissolved Oxygen at Hill Road 1998- 2002



Chapter Five

Recreational Impacts

Introduction

Assessing and modifying human impacts are the starting and end points in any effort to enhance watershed health. In western Oregon, the upper reaches of most watersheds are unpopulated, heavily forested areas that have become de facto recreation areas. The ridgelines framing the Mohawk Watershed meet these criteria, attracting significant human traffic. Hunting, target shooting, fishing, hiking, camping and off-road vehicle (ORV) riding are the most common activities that leave a human footprint on the landscape. The vast majority of land above the valley floor is owned either by the federal government and managed by the Bureau of Land Management (BLM), or privately held by Weyerhaeuser (a timber company). While access to Weyerhaeuser property is generally limited, the BLM has constructed many roads, a campground, ORV trails, and has designated several areas for target shooting. With all human traffic comes a combination of predictable influences on the land that can create negative impacts to water quality and stream health.

It was the job of the Service Learning Program to assess these recreational impacts in the Mohawk watershed and make suggestions to the Mohawk Watershed Partnership (MWP) that would work towards reducing the overall impact. The Service Learning Program was also charged with the task of producing a PowerPoint presentation that could be delivered to recreational users. This presentation would aim to educate and inform individuals of the importance of responsible recreational use.

Purpose

The goal of this study is not to exclude humans from these lands, but to look for ways to reduce the negative impacts of human activities. The Service Learning Program concentrated its study efforts to the McGowan sub-basin to help the MWP systematically minimize recreational impacts in the Mohawk watershed.

The Issues

Discussions with BLM personnel, local law enforcement officers (Lane County Sheriff's Department), and many explorations throughout the McGowan sub-basin helped the Service Learning Program identify illegal trash dumping, shooting, and off-road vehicle use in undesignated areas as the three most significant recreational issues affecting watershed health. Obviously, trash dumping is not a recreational activity, but much of the garbage left behind is found at shooting sites, suggesting a connection between these two activities. Below is a brief discussion of each of these primary issues and the negative impacts they present to the watershed.

The Service Learning Program identified illegal trash dumping, shooting, and off-road vehicle use in undesignated areas as the three most significant recreational issues affecting watershed health.

Trash Dumping – Historically, portions of the Mohawk Valley have been used as a dumping ground for stolen cars, old appliances, and other refuse not typically picked-up by curbside trash collectors. According to a Lane County Sheriff's Deputy, patrols on BLM lands have increased significantly since June 2002 and resulted in reductions in some illegal dumping, particularly as it relates to stolen vehicles. This is good news for the watershed because cars and appliances use a variety of lubricants, fuels, and other chemical compounds (refrigerants etc.). These hazardous chemicals represent a significant source of pollution, especially for smaller streams in the upper watershed. Besides polluting waterways, illegal dumping is also an eyesore and detracts from the natural beauty of the region.

Target Shooting – On the surface, target shooting appears like a relatively low impact land use. However, this is not the case. The major impact of shooting is litter, referred to as the “shooter's package” by the BLM. This ‘package’ of litter includes spent shell casings (both plastic shotgun shells and brass rifle casings), empty ammunition boxes, and various items used for targets that include illegally dumped appliances, glass and aluminum beverage containers, and countless other trash items. Shooting trash, particularly appliances, is hazardous because it can release toxics into a stream, either directly or through the groundwater. Heavily used areas (mostly

around abandoned rock quarries) contain significant amounts of litter and are quite literally carpeted with thousands of spent shells and other elements of the “shooter’s package.” Sadly, a great deal of the shooting seems to be occurring in areas that are clearly signed “No Shooting” by the BLM. Unfortunately, these signs are often vandalized with bullet holes.

Shooting can also lead to soil erosion. Concentrated shooting into an embankment can cause a loosening of the soil and eventually lead to significant soil erosion. As an example, a target range in Springfield that was used for years by the Springfield Police had to be permanently closed following a landslide.

Off-Road Vehicle Trails – The Coburg Hills on the west side of the watershed have long been a popular area for trail-riding by motorcyclists and other motorized three and four-wheel all-terrain vehicles (ATV’s). The BLM currently offers about 6000 acres for ORV use and 18 miles of designated trails within the Mohawk Valley. This area can be accessed via Shotgun Creek Road. It does not extend into the McGowan Creek sub-basin, yet there are numerous unauthorized ORV trails in the sub-basin. Many of these unauthorized trailheads have already been blocked with mounds of dirt, logs, and large rocks by the BLM. Each new unofficial trail created disturbs the limited ground cover that provides soil stability on the forest floor. These rogue trails can loosen the topsoil layer and compact the soil beneath it. Consequently, topsoil can be quickly washed away with rain, leaving areas unsuited for re-vegetation and unprotected from ongoing erosion. Soil compaction adds to erosion by decreasing the amount of water entering the water table and by increasing the amount of surface run-off. This erosion equates to increased turbidity (muddiness) downstream, particularly in the main stem of the Mohawk River, which is fed by numerous creeks that originate in the Coburg Hills.

The Mohawk Watershed Partnership recognizes the positive economic benefits of recreational activities in the valley. This study is focused on finding ways to create greater public awareness for responsible recreational use by creating educational outreach programs and materials for recreational users.

Recreational Impact Study

Methodology

In conducting this study, we engaged in the following information-gathering activities:

1. Numerous visits were made to the McGowan sub-basin. We drove all the roads identifying, assessing, and mapping any significant human impact sites we found.
2. We conducted informal interviews with personnel from both the BLM and the Lane County Sheriff's Department in order to gain a better understanding of their combined management efforts in the watershed.
3. We identified numerous recreational user groups, clubs, and businesses and created a contact list for the MWP to use in future outreach efforts.
4. We also interviewed officers and staff of recreation clubs and businesses to find out how they are educating their members/customers to act responsibly.

Findings

During the course of four visits to the McGowan sub-basin between November 2002 and March of 2003, we found and mapped 35 sites with significant human impacts. These sites were overlaid onto a BLM base map of the sub-basin. Additionally, we created a spreadsheet that has an assessment of each site in terms of cleanup priority, quantity and type of garbage present, and any special equipment needed to remove the trash (on file at the MWP office). This map and the corresponding spreadsheet were used for a sub-basin cleanup day conducted by the MWP and other partner organizations on May 17, 2003. We created four sub-maps identifying four different site types: large item dumping (cars, car parts, appliances and furniture), small item dumping, shooting sites (both authorized and unauthorized) and ORV trailheads (see appendix D).

Interviews with BLM and Lane County Sheriff personnel revealed that trying to limit illegal activities in this area is an ongoing battle. The BLM has a new informational kiosk at the base of McGowan Creek Road offering a detailed map of the area and handouts outlining shooting and

hunting guidelines as well as other recreation restrictions. According to a deputy we spoke with, the sheriff's department has stepped up their patrolling of BLM lands since June 2002. He indicated that the dumping of stripped-out stolen vehicles has decreased since that time. He also noted that they write numerous citations for shooting in unauthorized areas. However, given how easy it is to quickly dump items and move on, catching the perpetrators off illegal dumping is a challenge.

To help the MWP to reduce recreational impacts, we have created a contact list of clubs and businesses that serve members and customers who are potential recreational users of the watershed (see appendix D). The list includes internet addresses, mailing addresses, phone numbers, dues, meeting dates, and identifies officers of these recreation clubs and businesses. The MWP can work with these groups to minimize recreational impacts and to promote responsible recreational activities. As part of this study, we also created a PowerPoint presentation designed to raise awareness about negative recreational impacts. This presentation will be available to clubs that are willing to participate in this educational effort and would like to present it to their members (see appendix F).

Through examining websites and talking to officers of the recreation clubs, we found that most are already making an effort to educate their members about responsible use. The ORV clubs, Emerald Trail Riders Association and Oregon Motorcycle Riders Association, hold monthly work parties and often partner with the BLM to maintain trails. Both organizations have links to Oregon off-road guidelines on their websites and also have links to "Tread Lightly", a set of off-road guidelines aimed at lessening impacts on the land. These organizations are determined to maintain a good public image and share a goal of creating greater access to public lands for their riding activities. They encourage their membership to buy all necessary permits and licenses and to stay on designated trails at all times. Riders who do not belong to organized groups are probably the ones responsible for creating most rogue trails.

Overall, we found less unauthorized ORV trails than expected. Mountain biking in the Mohawk Watershed is minimal. There are currently no bike-only trails in the watershed. According to staff at local bike shops, the BLM's multiple use trails get too rutted by motorcycles to be used

by mountain bikes. Some people we talked to indicated that the amount of shooting activity might deter some mountain bikers from choosing the Mohawk Valley as a safe place to ride.

In terms of extent, target shooting appears as the most widespread recreational activity in the McGowan sub-basin.

We found dozens of small sites with evidence of shooting activities (spent shells, targets etc.). Almost every shooting site had trash and litter. Ironically, one of the few outdoor

shooting ranges in Lane County is at the base of McGowan Creek Road. The Emerald Empire Gun Club is a private club with annual dues. However, the gun range is available to the general public for only \$5 per gun per day. This provides a low cost alternative to much of the shooting that occurs in the watershed.

In terms of extent, target shooting appears to be the most widespread recreational activity in the McGowan sub-basin.

Recommendations

Based on interviews described above, it appears that the many of the recreational users of watershed lands are not Mohawk Valley residents and are not affiliated with organized clubs. Any effort to do community outreach and education surrounding recreational/human impacts must take this into account. Community outreach should be designed to reach a broad audience and cover the entire Eugene-Springfield area. Given that enhancing the watershed is a long-term project, perhaps the best approach is to direct efforts towards influencing future users through the local schools rather than trying to change the ingrained bad habits of the current users.

The organized riding clubs are already partnering with the BLM to maintain trails and remove trash from riding areas. They are involved in long-term efforts to negotiate for more access to public lands. The local gun club also maintains a close relationship with law enforcement agencies in an effort to notify them of any illegal activities they notice along the main road into the McGowan sub-basin. Their members have also participated in past cleanup days in the area. These groups certainly offer some opportunities to raise awareness about human impacts in the watershed. However, much of what they are doing already involves responsible stewardship. In some cases, educational outreach would amount to “preaching to the choir.”

The MWP has considered producing a brochure outlining ways to lessen the human impacts (via recreational activities) on the landscape and distributing these materials through local user clubs and businesses. Many of these groups already have such materials and distribute them regularly to their members. Additionally, the BLM has published materials and information kiosks at all their recreation sites in the valley. Producing such a brochure is potentially just a duplication of previous efforts.

We do not have any solid recommendations for getting educational information into the hands of those who are not affiliated with organized groups. However, one alternative might be to set up a check station at the base of McGowan Creek Road one weekend a month to distribute such literature and talk briefly with each recreational user as they enter the sub-basin.

Until low-cost disposal and recycling opportunities are more readily available, solving the dumping problem will be difficult.

Minimizing recreational impacts is difficult because many of the undesired human activities result from efforts to avoid cost. Trash dumping in the watershed sidesteps the cost of curbside service or a trip to the county dump. Until low-cost disposal and recycling opportunities are more readily available, solving the dumping problem will be difficult. Shooters in the Mohawk watershed are also trying to cut costs by shooting illegally. As long as target shooting in the watershed requires no daily or annual permit/fee, there is no motivation for shooters to see the gun club as an alternative. Despite this, we do recommend that the MWP look into ways to better promote the gun club as an alternative illegal shooting. Pacing signs that promote the use of the gun club at the McGowan Creek Road kiosk and along the road up into the sub-basin could promote the gun club as a more environmentally friendly shooting choice.

Ultimately, the solution to these and other problems in the watershed must come from a broad community of interests. Recreational clubs, the BLM, law enforcement, the Mohawk Watershed Partnership, and other partner organizations and agencies will have to find common goals and work together to get a unified message out to as many people as possible.

Chapter Six

Watershed Clean-up

Introduction

Illegally dumped trash is a widespread problem throughout the Mohawk watershed. Items like car parts, tires, propane tanks, computers, television sets, and furniture are commonly found in remote areas of the watershed. Debris from recreational shooting is also common and includes spent ammunition shells, targets, and clay pigeons (for more information on illegal dumping and recreational use see chapter five). Illegally dumped trash and litter in the Mohawk watershed is typically found on Bureau of Land Management (BLM) and Weyerhaeuser land, in particular, areas that have forest clearings.

Recognizing that illegally dumped trash is both an eyesore and a watershed health risk, the Mohawk Watershed Partnership (MWP) worked with the Service Learning Program to reduce as much of this trash as possible. On May 17, 2003, the Service Learning Program, with the combined effort of the MWP and SOLV, coordinated a clean-up event in the McGowan sub-basin. This day was part of a larger effort throughout Oregon to enhance, clean up, and preserve Oregon's beautiful landscapes. This larger event, known as "Down by the Riverside," was organized by SOLV and funded in part by the Oregon Lottery. SOLV provided many resources for the clean-up day including work gloves, garbage bags, first aid kits, sharps containers, safety vests, and t-shirts.

It was the job of the MWP and the Service Learning Program to find and monitor dumpsites, organize volunteers, and find other sponsors to provide additional resources that were needed to run the clean-up day.

Purpose

The McGowan sub-basin "Down by the Riverside" event had two objectives. The first objective was to clean up areas degraded by those using the land irresponsibly, either by illegally dumping garbage, shooting, or littering. The other objective was to educate the community about these impacts and to get them proactively involved in the watershed. Through this, the MWP hopes to

not only clean up the watershed, but to increase community involvement in watershed protection and restoration activities.

Clean-up Day Preparation

Methods

Beginning in February and March of 2003, a member of the Service Learning Program began looking for illegal dumpsites in the McGowan sub-basin. With the help of BLM roadmaps, our team member drove along many miles of roads, including logging roads. When a trash site was found, a digital picture was taken, items of trash were cataloged by type and quantity, and global positioning system coordinates were written down. In all, twenty-three sites were found, cataloged, and monitored (see appendix D).

Pre-event Logistics:

SOLV provided primary planning for “Down by the Riverside” by means of a forty-page “Coordinator’s Handbook”. The handbook provided resources for and insight into planning, organizing, funding, and advertising the clean-up event. In March, SOLV met with area coordinators to go over the handbook, answer any questions, and to hand out garbage bags, tee shirts, and work gloves. It was then the job of the Service Learning Program and the MWP to get additional donations, volunteers, and any other resources needed for the clean-up day.

The MWP and the Service Learning Program were able to secure several donations for the McGowan sub-basin clean-up. A 30 cubic yard dumpster from Sanipac was donated, disposal fees for dumping items like tires and metals were waived by Lane County, and costs of refreshments and pizza were reimbursed by Weyerhaeuser. The University of Oregon’s Outdoor Program Other donated the use of several two-way radios and Yellow Cedar Sales donated several wooden stakes that were used for signs.

The event was publicized in many ways. SOLV provided brochures and posters that advertised the time and day of the 135 “Down by the Riverside” May 17, 2003 projects. The Service Learning Program created more specific fliers to publicize the event throughout the Marcola area and at the University of Oregon. Service Learning Program students also spoke at the MWP’s

May 6, 2003 monthly meeting to inform MWP board members and the local citizens in attendance about trash and illegal dumping in the McGowan sub-basin and the subsequent clean-up. During this presentation a request for volunteers was also made.

The day before the event, three Service Learning Program students drove up to the designated trash areas and flagged them with colored tape wrapped around wooden stakes. Of the 23 trash sites originally found, four were chosen to clean up on May 17. Each of the four sites was marked with its own unique color. The color-coded system provided volunteer clean-up crews with easy directions to each clean-up site.

Down By Riverside Clean-up Day

Summary

Lauri Mullen (the MWP coordinator) and the Service Learning Program team members arrived at the Mohawk Community Church on Hill Road at 8:30 AM on May 17, 2003. At this time, each team member was given instructions regarding which clean-up site he/she would supervise. They were also given instructions on safety standards and precautions and on proper disposal standards for different types of trash. For example, trash like car tires and metal could not go into the dumpster. Instead, these items would have to be discarded at the waste transfer station located at Shotgun Park.

Most volunteers arrived by 9:00 AM. SOLV required volunteers statewide to sign a waiver acknowledging the risk associated with trash clean up. Volunteers were also briefed on safety standards, precautions, and assigned to clean-up crews.



Figure 6.1: A volunteer helps clean up the shooters package, a collection of spent ammunition and shooting-related debris.



Figure 6.2: Collected trash from the event filled a 30 cubic yard dumpster nearly 2/3 full.

In total, about twenty volunteers participated in the clean-up event. The volunteers included a diverse range of individuals from the University of Oregon, the MWP, Weyerhaeuser, the Bureau of Land Management, and the surrounding community.

After first meeting as a large group, volunteers broke off into their work parties shortly after 9:00 AM. The BLM was kind-enough to donate the use of a flatbed

truck to help the volunteers transport the collected trash from each site to the large dumpster placed on lower McGowan Creek Road. By using two-way radios, the volunteers were able to efficiently communicate with each other and to arrange for trash to be hauled to the dumpster. Because the volunteer turnout was less than expected, the original plan of cleaning four sites was changed to three. However, in addition to the three work parties, a fourth group was designated as a “roaming crew” and charged with the task of driving along BLM roads and picking up whatever trash they saw. Because of the productivity of volunteers, two small additional sites were also cleaned up.

Over the course of the event, which lasted from 9:00 AM to 1:00 PM, approximately 4 tons of garbage was collected! Also collected but not included in this figure were 11 tires and a flatbed truck completely filled with recyclable metal!

At the end of the clean-up event the volunteers gathered for pizza and refreshments in the parking lot of the Mohawk Community Church. At this time, free t-shirts sponsored by SOLV and the



Figure 6.3: Several tires and pieces of scrap metal were found in the McGowan sub-basin. The scrap metal in this photo is from a car and some appliances. They have been shot several times.

Oregon Lottery were handed out. Volunteers were amazed at the items found and the amount of trash collected. Hopefully the success of this clean-up day will provide momentum for future clean-up days.



Figure 6.4: One of the sites before cleanup (left) and after (right). This particular site was replete with shotgun shells, appliances, and other miscellaneous debris.

Appendix A

Survey Results

<u>Statement</u>	<u>Strongly Agree</u>	<u>Agree</u>	<u>Neutral</u>	<u>Disagree</u>	<u>Strongly Disagree</u>	<u>Don't Know</u>
1. In my opinion, improving water quality in the Mohawk River is an important issue for the Mohawk Valley	70%	29%	0%	3%	0%	0%
2. In my opinion, improving habitat for fish is an important issue for the Mohawk Valley	62%	29%	6%	0%	0%	0%
3. In my opinion, educating people about ways to reduce their impacts on the watershed results in improved water quality over the long term	38%	18%	3%	15%	6%	17%
4. In my opinion, restoration projects (removing invasive species, fencing livestock away from stream, planting native trees and shrubs) results in improved water quality over the long term.	73%	20%	3%	3%	0%	0%
5. In my opinion, current timber industry practices are a major barrier to improving water quality in the Mohawk Valley.	38%	18%	3%	15%	6%	18%
5. In my opinion, poorly maintained septic systems are a major barrier to improving water quality in the Mohawk Valley.	35%	26%	18%	6%	0%	12%
7. In my opinion, invasive species (such as Blackberry, Scotch Broom and Reed Canary Grass) are a major problem in the Mohawk Valley.	44%	32%	6%	9%	0%	5%
3. In my opinion, illegal dumping of trash is a major problem in the Mohawk Valley.	62%	32%	6%	9%	0%	3%
9. In my opinion, off-road vehicle (ORV) use is a major problem in the Mohawk Valley.	35%	26%	18%	3%	6%	9%

10. How do you rate your personal **level of concern** about water quality in the Mohawk Valley (Please check only one box).

35.% - Very High 44 % - High
 11% - Medium 0 % - Low
 6% - I'm not concerned

11. How do you rate your personal **commitment** to improving water quality in the Mohawk Valley (Please check only one box).

26 % - Very High 41% - High
 21% - Medium 3% - Low
 6% - None

12. The Mohawk Watershed Partnership is a: (check the one that best describes the MWP)

- 0% - Federal agency
- 32% - State agency
- 0%- Non- profit organization
- 53% - Volunteer organization
- 0% - For profit business

	True	False
13. The Mohawk Watershed Partnership educates the public about a wide variety of issues connected to the Mohawk Valley.	97%	0%
14. The Mohawk Watershed Partnership protects endangered species and their habitats by enforcing existing local, state and federal laws.	21%	68%
15. The Mohawk Watershed Partnership drafts new laws designed to improve water quality.	18%	56%
16. The Mohawk Watershed Partnership coordinates voluntary restoration projects	97%	0%
17. The Mohawk Watershed Partnership monitors water quality in the Mohawk Valley.	88%	3%

To be involved with the Mohawk Watershed Partnership (attend meetings, be on the mailing list, join a sub-committee) you have to:

	True	False
18. Have a college degree	3%	91%
19. Have professional experience in natural resources	3%	91%
20. Be a landowner in the Mohawk Valley	24%	68%
21. Work for a government agency	0%	94%
22. Live in the Mohawk for at least 2 years	9%	85%
23. Anybody can participate	97%	0%
24. Be elected at the annual meeting	15%	79%
25. Pay monthly dues	3%	88%

26. What is your level of involvement with the Mohawk Watershed Partnership (Check all that apply)

- 0% - I have never heard of the Mohawk Watershed Partnership
- 91% - I read the newsletter
- 21% - I have looked at the MWP webpage
- 15% - I serve or have served on a committee or the Executive Board
- 41% - I have volunteered for a clean-up day or planting project
- 38% - I attend the meetings (Please place a check by the most appropriate category)
 - 24% - every month
 - 21% - every other month,
 - 21% - twice a year
 - 3% - less than twice a year
 - 12% - don't attend meetings
- I donate to the MWP (Please place a check by all that apply)
 - 41% - time
 - 9% - expertise
 - 18% - equipment
 - 15% - money
 - 0% - I am not involved in any way

27. I participate in the Mohawk Watershed Partnership: (Please check all that apply)

- 29% - To meet people in the community
- 3% - To make sure they don't try to enact laws and rules that I don't like
- 47% - To get educated about local issues
- 59% - To help improve local environmental conditions
- 29% - I don't participate

28. I would become more involved with the Mohawk Watershed Partnership and its projects if: (Please check all that apply)

- 47% - I had more time
- 3% - The meetings were held at a better time
- 9% - I were better informed about upcoming events
- 3% - If projects were located near my home or business
- 9% - The meetings and projects were more interesting
- 15% - don't want to become involved

29. Please rank the following Mohawk Valley Council activities according to its usefulness to you. Place a 1 by the most useful, a 2 by the second most useful, a 3 by third most useful, and a 4 by the fourth most useful and a 5 by the least useful.

	1	2	3	4	5
Monthly meetings	3%	6%	6%	18%	44%
Newsletter	24 %	15%	23 %	12%	0%
Restoration projects	32 %	18%	12%	9%	6%
Education and outreach efforts	6%	29%	29%	12%	0%
Building a sense of community	12%	9%	3%	26%	26%

	Yes	No
30. I have conducted a restoration project on my property.	53%	44%
31. I would like to conduct a restoration project on my property.	41%	41%
32. I have volunteered my time to help a neighbor in the Valley conduct a restoration project on his/her property.	32%	65%
33. If I were asked, I would be likely to donate my time to help a neighbor in the Mohawk Valley conduct a restoration project on his/her property.	56%	32%

Please rate the Mohawk Watershed Partnership's performance on the following activities:

Activity	excellent	above average	average	below average	don't know
34. Education about watershed issues	41%	38%	15%	0%	6%
35. Outreach efforts	24%	35%	26%	0%	12 %

36. Newsletter	41%	35%	24%	3%	3%
37. Coordinating restoration projects	35%	35%	15%	0%	12%
38. Community building	18%	29%	29%	6%	21%
39. Raising money for restoration projects	18%	15%	29%	6%	32%
40. Monitoring water quality	35 %	32%	12%	0%	0.18%

<u>Statement</u>	<u>Strongly Agree</u>	<u>Agree</u>	<u>Neutral</u>	<u>Disagree</u>	<u>Strongly Disagree</u>	<u>Don't Know</u>
41. Overall, the activities of the Mohawk Watershed Partnership are having a positive influence in the Mohawk Valley.	62%	32%	0%	0%	3%	0%
42. Overall, the activities of the Mohawk Watershed Partnership are having a visible impact in the Mohawk Valley.	29%	41%	15%	3%	0%	9%

43. Overall, I believe the Mohawk Watershed Partnership does: (Please check only one)

65% - A great job	0% - An average job
0% - A poor job	21% - I don't know
12% - I never heard of the Mohawk Watershed Partnership	

44. Please check one:

50% - Male	50.% - Female
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45. Please check your age category:

0% - less than 18	21% - 18 – 35
3% - 36 – 50	74% - Over 50

46. How long have you lived in the Mohawk Valley. Please check one

0% - Less than 1 year	12% - 1 – 3 years	30% - 4 – 10 years
18% - 11 – 20 years	41% - More than 20 years	

47. Do you have access to the internet in your home?

74% - Yes	24% - No
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48. Do any rivers, streams, or creeks border or cross your property?

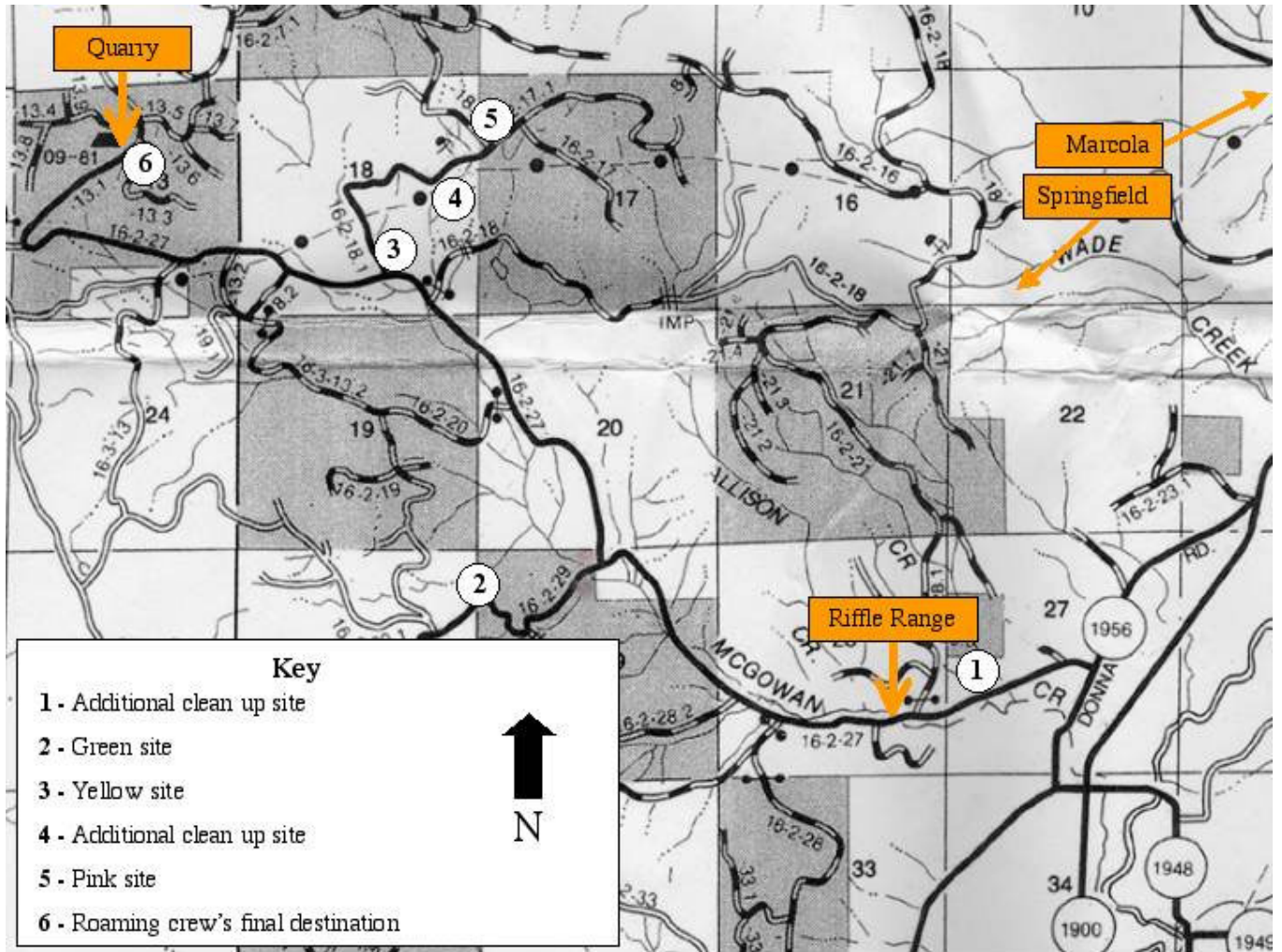
68% - Yes	32% - No
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49. Additional comments

35%

Appendix B

McGowan clean-up Sites



Appendix C

Recreational users contact list

This is a list of groups and information sources relating to recreational use in the watershed. The primary human impacts in the upper elevations of the watershed are illegal dumping, shooting and off-roading on unauthorized trails. Discussions with officers and representative of the organized clubs indicate that they work hard to maintain a good image by participating in work parties to maintain trails and cleanup, abiding by all applicable laws and regulations, and staying with authorized areas. They also want to work with the BLM and other public land managers to insure access and help maintain designated facilities. The negative impacts are likely coming from users who are not affiliated with organized groups

Collins Cycle Shop – 60 E. 11th Eugene, OR 97401. Ph. 541-342-4878. Sells mountain bikes, staff is knowledgeable about local trails.

According to the staff at Collins (Steve), The Coburg Hills are not as desirable a mountain-biking area because of heavy motorcycle usage. Once motorcycles have been on the trails, particularly in winter, the trails become too rutted for mountain biking. They knew of no bike only trails in Coburg Hills. I asked if the amount of shooting in the area was a factor, and he felt that was a factor in how many mountain-bikers use the area. He did mention he knew of some informal groups that meet at the top of Shotgun and Parsons Creek Roads in during the summer to ride down the main roads.

Emerald Empire Gun Club -- Located at the base of McGowan Creek Rd. Ph. 541-747-6666. Has approximately 300 members from central Lane County. Offers annual membership, \$125 (includes membership in National Rifle Association) a portion of which can be credited for time volunteered at working at the range. The general public can use the range for \$5/per gun/ per day. In past years they have worked closely with the BLM, reporting suspected illegal activities and participating in clean-up days. I spoke with Paul Lewis, who works as range master at the club. They do make an effort to publicize both events and their access for the general public with local gun and sporting goods stores. According to Paul, there are no other organized shooting clubs in the local area.

Emerald Trail Riders Association – P.O. Box 41617 Eugene, OR 97404. Local OHV trail riding group. Meets 3rd Thursday of each month. During cool rainy months they meet at Roaring Rapids Pizza, 4006 Franklin Blvd. Glenwood and they meet outdoors during late spring and summer. Check website, www.etra.net for meeting dates and club events.

Contacts

President: Adam Achepohl 541-688-6352

Newsletter Editor: Bob Reinen 541-995-7755

I talked to Bob Reinen and he provided the following information. The club is actively working with the BLM to create authorized riding trails in the Mohawk watershed. They started this process about 8 years ago and thus far are frustrated by their lack of progress. They have volunteered to do trail maintenance and help install signs and trail markers, but have not been invited to do so. They do hold about 12 workdays per year to do trail maintenance. These normally last about 5 hours and have 10-20 participants from the club (approx. 100 members). They are willing to publish articles of common interest provided by the MWP and would be willing to include MWP Recreational Use brochure with other educational materials they send to all new members. These materials include brochures covering, trail etiquette, noise reduction, trail sharing, and staying on authorized trails.

GEARS (Greater Eugene Area Riders) – P.O. Box 10244 Eugene, OR 97400, Ph. 541-345-3181 (Mel Huey).
President, Phil Lynch.

Webmaster, Mel Huey, email melhuey@aol.com.

This is a local bicycling organization that coordinates recreational rides, works to create more bike access to public lands and roadways. It looks like they are primarily road-riders.

OHV Riding Areas – This online site has maps, directions and description of all Off-highway Vehicle (OHV) riding areas statewide. It has a map and description of the Shotgun OHV riding area in the Mohawk watershed.

Oregon Motorcycle Riders Association (OMRA) –

Current President, Jon Allred, 503-6424890.

They have general information line at 503-678-2779. This is a statewide organization that is involved in several aspects of this recreational activity since 1972. They work to protect access to public and private lands for off-road motorcycle use. They sanction racing events, meet monthly, publish a quarterly newsletter, keep an updated website (www.omraonline.org/about_us.htm), participate in trail and riding area maintenance projects, and encourage their members to ride responsibly while obeying all laws and regulations that apply to off-road motorized vehicles. Most of their activities occur in the Northwest corner of Oregon and they are based in the Portland area. Their calendar listed no events in Lane County or more specifically in Mohawk Basin. Their annual dues are \$10/individual and \$25/family for non-racers. They have monthly meetings at 7:00 PM on the first Weds. of each month at Denny's Restaurant in Tigard, OR.