table 2-1. Perennial Streams in the Middle Kickapoo River Watershed

Subwatershed	Perennial Streams	Length (miles)	Gradient Ft./mile	Stream * Classification
	Kickapoo River	40.5	3.6	Warm Water Sport
Bear Creek	Bear Creek	1.6	20	III
	North Bear Cr.	5.3	48	III
	South Bear Cr.	0.9	45	III
		1.6		I
	Middle Bear Cr.	1.8	20	III
		0.5		II
	Creek 11-14	1.0	-	Forage
Billings Creek	Billings Creek	7.0	20	II
	Johnnycake Hollow Cr.	1.8	75	Forage
	Creek 34-10	1.2		Forage
Brush Creek	Brush Creek	7.7	15	III
	Upper Brush Creek	2.6	46	III
	Lower Brush Creek	1.5	6	Forage
Camp Creek	Camp Creek	5.5	33	I
	Bufton Hollow Cr.	1.1	91	I
	Creek 11-14	1.0		Forage
Chadwick Hollow	Chadwick Hollow Cr.	0.5	20	Forage
Cheyenne Valley	Cheyenne Valley Cr.	6.0	46	II
	Creek 22-6	1.0	100	Forage
	Creek 15-14	0.7	125	Forage
Elk Creek	Elk Creek	5.0	20	I
	Tenny Spring Creek	1.4	100	I
	Hoke Creek	0.7	144	I
Goose Creek	Goose Creek	3.0	81	II
	Welker Hollow Cr.	1.8	92	Forage
Hay Valley	Indian Creek	2.2	59	Forage
	Creek 22-8	1.8	53	Forage
Jug Creek	Jug Creek	5.5	70	Forage
Otter Creek	Otter Creek	4.5	43	III
	Plum Run	0.8	87	Forage
	Creek 24-7	1.0	120	Forage

Table 2-1. Perennial Streams in the Middle Kickapoo River Watershed (cont.)

Subwatershed	Perennial Streams	Length (miles)	Gradient Ft./mile	Stream * Classification
Viola	Kickapoo River			
Warner Creek	Warner Creek	8.6	32	II
	Warner Branch	3.0	60	III
	Creek 36-9	1.5	80	Forage
	Creek 31-12	1.5	60	Forage
	Creek 6-2	1.0	73	Forage
	Creek 4-12	2.5		Forage
Weister Creek	Weister Creek	7.8	39	III
	Twenty-four Valley Cr.	2.0	87	III
	Creek 26-15	2.0	75	Forage

* Trout Stream Classifications (DNR, 1980):
Class I - sufficient natural reproduction to sustain populations of wild trout
Class II - some natural reproduction of trout, good survival and carryover of adult trout
Class III - no natural reproduction of trout, marginal trout habitat

table 2-2. Private Well Monitoring Results

Nitrate Analysis Results							
Subwatershed	Number of Samples	0 - 2 (mg/L)	(%)	2 - 10 (mg/L)	(%)	> 10 (mg/L)	(%)
Bear Creek		3	50.0	3	50.0	0	0
Billings Creek	35	7	20.0	28	80.0	0	0
Brush Creek	44	22	50.0	21	47.7	1	2.3
Camp Creek	8	1	12.5	5	62.5	2	25.0
Chadwick Hollow	-	-	-	-	-	-	-
Cheyenne Valley	16	4	25.0	11	68.8	1	6.3
Elk Creek	14	3	21.4	10	71.4	1	7.1
Goose Creek	5	3	60.0	1	20.0	1	20.0
Hay Valley	6	4	66.7	2	33.3	0	0
Jug Creek	-	-	-	-	-	-	-

Table 2-2. **Private Well Monitoring Results** (cont.)

Nitrate Analysis Results							
Subwatershed	Number of Samples	0 - 2 (mg/L)	(%)	2 - 10 (mg/L)	(%)	> 10 (mg/L)	(%)
Otter Creek	8	1	12.5	3	37.5	4	50.0
Viola Creek	-	-	-	-	-	-	-
Warner Creek	5	3	60.0	1	20.0	1	20.0
Weister Creek	15	6	40.0	8	53.3	1	6.7
total:	162	57	35.2	93	57.4	12	7.4

Groundwater Resources

An aquifer is an underground rock or soil formation that stores and transmits water to lakes, streams, springs, and wells. Groundwater is available mainly from the sand and gravel aquifer, and the sandstone aquifer underlying the watershed. Aquifers in the Middle Kickapoo River Watershed are discussed in order of occurrence beneath the surface.

Sand and Gravel Aquifer

The sand and gravel aquifer is found in limited areas within the watershed. The main location is along the valley of the Kickapoo River in the lower portion of the watershed. This aquifer is composed of alluvial materials that contain water at depths of less than 50 feet. Water yield to wells in this aquifer is generally low (less than 100 gpm).

Groundwater in these deposits occurs and moves in the void spaces among grains of sand and gravel. It is locally important as a source of groundwater for private use where there are relatively thick saturated unconsolidated deposits. The potential for contamination is high because the rapid infiltration and shallow depth to groundwater provide little attenuation of contaminants.

Sandstone Aquifer

The sandstone aquifer is the most important source of groundwater in the watershed. This bedrock sandstone layer occurs at depths of 60 to 1000 feet, and is composed of several geologic formations including the Cambrian sandstone and Prairie du Chien dolomite. The Cambrian sandstone is the most important water yielding formation and occurs throughout

the Middle Kickapoo River Watershed. The Prairie du Chien formation is dense dolomitic rock that has low permeability and is discontinuous in the watershed.

The sandstone aquifer is more than 50 feet thick in the region and provides reliable supplies of water suitable for municipal, industrial, and agricultural uses. On ridge tops in the Driftless Area, this bedrock layer is commonly within five feet of the surface, and in places is exposed at the surface.

The sandstone aquifer in this region of the state is unconfined and is hydraulically connected to the aquifer above. Recharge to the sandstone aquifer passes through the unconsolidated sand and gravel aquifer where present, or through surface soils, rendering this aquifer susceptible to contamination from surface land uses.

Crystalline Bedrock Aquifer

The crystalline bedrock aquifer is located beneath the sandstone aquifer in formations more than 600 million years old. This aquifer is not an important source of water in the watershed. Most of the deposits are very dense, extremely deep, crystalline rock which normally yield small amounts of water.

Private Well Monitoring Results

In order to acquire initial environmental health information on the quality of groundwater in the watershed, a monitoring survey was conducted during the summer of 1990 to measure well water nitrate concentrations. The results of this survey are summarized in table 2-2.

A large number of samples fell into the range of 2 mg/L to 10 mg/L. Ninety-three, or 57% of the wells tested were in this range, commonly known as the Preventive Action Range. This range indicates that the water is safe for consumption, but the well owner should monitor the well on a yearly basis to determine changes in quality.

The survey gives an overall assessment of nitrates in well water in the watershed, and indicates that continued monitoring is important. The information also shows that only a small percentage (7.4%) of the wells have problems which require action. In general, the groundwater throughout the watershed should benefit from the adoption of management practices to control nutrients.

Endangered Resources

Information on endangered resources was obtained from the Bureau of Endangered Resources (Bureau of Endangered Resources) of the DNR. Endangered Resources include rare species and natural communities. It should be noted that comprehensive endangered resource surveys have not been completed for the entire Middle Kickapoo River Priority Watershed.

Since data files are incomplete, the absence of occurrence records for any species or natural communities does not preclude the possibility of their presence in the project area.

Rare Species

Rare species are tracked by Wisconsin's Natural Heritage Inventory and include Federal and State listed Endangered, Threatened and Special Concern species.

An Endangered species is any species whose continued existence as a viable component of Wisconsin's nature flora and fauna is determined by the department to be in jeopardy on the basis of scientific evidence.

A Threatened species is any species which appears likely, within the foreseeable future, on the basis of scientific evidence to become endangered if no action is taken.

A Special Concern species is any species about which some problem of abundance or distribution is suspected in Wisconsin, but not yet proven. The purpose of this category is to focus attention on certain species before they become endangered or threatened.

The following rare species are found within the Middle Kickapoo River Priority Watershed:

Endangered Species:
lapland rosebay (*Rhododendron lapponicum*)
worm-eating warbler (*helmitheros vermivorus*)

Threatened Species:
wood turtle (*Clemmys insculpta*)
northern monkshood (*Aconitum noveboracense*)
round-stemmed false foxglove (*Gerardia gattingeri*)
yellowish gentian (*Gentiana alba*)
muskroot (*Adoxa moschatellina*)
acadian flycatcher (*Empidonax virescens*)
cerulean warbler (*Dendroica cerulea*)
Kentucky warbler (*Oporornis formosus*)

Special Concern Species:
redside dace (*Clinostomus elongatus*)
Cooper's hawk (*Accipiter cooperii*)
cliff goldenrod (*Solidago sciaphila*)
snowy campion (*Silene nivea*)

Natural Communities

A natural area is an area of land and/or water which has educational or scientific value or is important as a reservoir of the state's genetic or biologic diversity and includes any buffer

area necessary to protect the area's natural values. Certain natural areas are designated State Natural Areas (SNA) according to a management and protection agreement between the state and the landowner. Natural areas are comprised of one or more natural communities, such as southern mesic forests, floodplain forests, and shaded cliffs.

The following SNA and its natural communities have been identified in the Middle Kickapoo River Priority Watershed area:

Mt. Pisgah hemlock - hardwoods: southern dry-mesic forest, northern mesic forest, shaded cliff

The following natural areas and their natural communities have been identified in the Middle Kickapoo River Priority Watershed area:

Bloomingdale hemlocks: northern mesic forest
bridge 8 cliffs and woods: northern mesic forest, pine relict, shaded cliff, southern dry-mesic forest
Champion Valley maple woods: southern mesic forest
Gochenaur woods: southern mesic forest
Hay Valley cliffs: northern mesic forest, shaded cliff
Ice Cave woods: northern dry-mesic forest
Jug Creek cliffs: northern mesic forest, shaded cliff, southern dry-mesic forest
Kickapoo uplands: northern mesic forest, open cliff, pine relict
La farge primrose cliffs: shaded cliff
Marshal woods: southern mesic forest
Mechanic rock: shaded cliff
Morris Creek woods: pine relict, shaded cliff, southern mesic forest
Mount Nebo maples: southern mesic forest
Rockton primrose cliffs: shaded cliff
Sheldon hemlock relic: northern mesic forest, shaded cliff
Smith's landing monkhood site: shaded cliff
South Hay Valley cliffs: northern mesic forest
Tunnelville yew relic: shaded cliff
Viola bluff: open cliff
Weister creek: northern mesic forest, pine relict, shaded cliff
Wildcat Mt. river cliffs: floodplain forest, northern mesic forest, shaded cliff
Wilton hemlocks: northern mesic forest, open cliff, shaded cliff, southern mesic forest

The specific location of endangered resources is sensitive information. Exact locations should not be released or reproduced in any publicly disseminated documents.

For projects planned within this watershed, contact the Director of the Bureau of Endangered Resources for guidance on the interpretation of endangered resource occurrence information.

CHAPTER THREE
Water Quality Conditions, Objectives, and Nonpoint Sources

Introduction

The first part of this chapter presents a general description of how nonpoint source pollutants impact water quality. The remainder of the chapter discusses: 1) the water resource conditions present in each of the 14 subwatersheds, plus those present in the Kickapoo River from Ontario south to the confluence of the West Fork Kickapoo River near Readstown, 2) the results of the nonpoint source inventories, 3) other potential pollutant sources, 4) the conditions that could be achieved in the streams if nonpoint sources of pollution were controlled, and 5) the amount of pollutant control necessary to achieve the desired water resource conditions.

The amount of pollutants generated from the following five nonpoint sources were inventoried and analyzed by subwatershed. The results are summarized in tables 3-1 - 3-4.

* eroding uplands (sediment and nutrients);

* eroding and trampled streambanks (sediment and direct habitat impairment);

* eroding gullies (sediment and nutrients);

* animal lots (oxygen demand and nutrients);

* winter spread manure (oxygen demand and nutrients).

One of the key indicators of the health of a stream in the Middle Kickapoo River watershed is the ability or inability of that stream to support trout survival and reproduction. The primary goal of the project is to improve and protect surface water quality in general. In the Middle Kickapoo River watershed there is a direct relationship between productive trout waters and good water quality. Therefore, many of the water resource objectives for this project involve improving trout habitat.

Water Quality Basics

Nonpoint source pollution is responsible for degraded conditions of the streams in this watershed. Excessive amounts of sediment, nutrients, organic material, and bacteria degrade the water quality resulting in streams not meeting their full use potential. Furthermore, sediment from the watershed settles out in the Kickapoo River causing both degradation of fish habitat and diminished recreational value. In this watershed the two most serious pollutants are sediment and animal waste.

Sediment

Sediment adversely impacts water resources in many ways including:

* suspended sediment makes it difficult for fish to see and catch food,

* high sediment concentrations abrade fish gills making the fish more susceptible to disease, and

* sediment that settles out in watershed streams and in the Kickapoo River fills deep pools eliminating cover and aquatic plant growth that are critical to fish habitat.

Major sources of sediment in this watershed are upland erosion (primarily from steep crop fields), gully erosion, and streambank erosion.

Manure

Manure contains several components that adversely affect water quality and aquatic life. Manure entering a stream breaks down, resulting in depletion of oxygen in water which fish need to survive. Also, manure contains ammonia, which in high concentrations is toxic to fish and other aquatic life. The nutrients in manure (including nitrogen and phosphorus) also promote nuisance algae and weed growth in streams and reservoirs. Finally, bacteria found in livestock manure may be harmful to livestock drinking the contaminated water, and to humans using the water for recreation.

The major sources of manure in this watershed are runoff from animal concentration areas (barnyards) and runoff from improperly field spread manure (winter spreading on steep crop fields and on flood plain crop fields).

Nitrates

Nitrate levels in the groundwater exceeding a concentration of 10.0 mg/l violate state groundwater standards. At this level it is recommended that infants not consume the water because the nitrate interferes with the ability of the blood to carry oxygen. High levels of nitrates may also be an indication that other contaminants are present in the drinking water.

High nitrate concentrations in the drinking water have also been linked to spontaneous abortions in livestock.

The most likely sources of nitrates in the groundwater in this watershed are nitrogen fertilizers applied to croplands and failing septic systems.

Establishing Water Resource Objectives

Water quality objectives were developed by DNR staff with assistance from the Monroe, Richland, and Vernon County staffs and the DATCP. Objectives were identified for each subwatershed and are listed in the following subwatershed descriptions. Details of objective development can be found in the Middle Kickapoo River Priority Watershed Water Resources Appraisal Final Report.

Bear Creek, Billings Creek, Camp Creek, Cheyenne Valley, Elk Creek, and Jug Creek subwatersheds were designated "high management" areas. Streams in these subwatersheds have as their objective either maintaining natural trout reproduction or establishing a wild trout fishery. As a result, these subwatersheds have somewhat stricter control requirements and relaxed easement eligibility criteria.

The management strategies developed to achieve the water resource objectives are based on voluntary participants in the program controlling all nonpoint sources on their property identified as critical. Further clarification of the voluntary nature of the program and the requirements of participants may be found in chapter 4.

Results of Nonpoint Source Inventories

Upland Sediment

Intensive agricultural practices cause considerable amounts of soil to erode and reach the surface waters of the Middle Kickapoo River watershed. Upland erosion is the major source of the sediments that are carried downstream, beyond individual subwatershed boundaries, eventually reaching the main stem of the Kickapoo River. Gully erosion from upland fields also contributes significant amounts of sediment.

Upland sediment sources were evaluated for the entire watershed (168 square miles). The results of this inventory are summarized in table 3-1. An estimated 31,811 tons of sediment per year (46% of all sediment) are delivered directly to surface waters in the watershed from croplands, developed areas, pastures, woodlots, and grasslands. Erosion from gullies was estimated using an average size and frequency of occurrence. Estimates indicate gullies

contribute 20,946 tons per year (30%) of the total sediment delivered to surface waters. Table 3-2 summarizes sediment loading from all sources.

In general, the inventory found many farmers in the watershed are already controlling upland erosion on their fields to some degree through contour strip cropping and other techniques. However, many of these same farmers are not controlling the gullies that develop on their property. Because of the topography of the watershed, these gullies represent significant current and future sediment sources.

Water quality objectives require sediment to be reduced by 50% throughout the watershed. This objective will be met if the following is achieved:

1. Reduce erosion on fields identified as Category I to T (see chapter 4).*
2. Reduce the number of gullies by 60%.
3. Reduce sediment tonnage from streambanks impacted by agriculture by 60%.

* "T" is the tolerable soil loss, or that amount of soil which can be lost from a given soil type and have that particular soil type retain its productivity.

Streambank Erosion

Streambank erosion from agriculturally impacted banks contributes an estimated 17,112 tons (24%) of the total sediment delivered to surface waters in the Middle Kickapoo River watershed. Of the 4035 degraded streambank sites in the watershed, agriculturally impacted sites total 2652, or 66% of all sites. 300,748 feet of streambank are currently open to cattle access. Table 3-3 summarizes the streambank inventory results including habitat degradation sites.

Water quality and habitat improvement objectives will be met if the following is achieved:

1. Reduce sediment tonnage from streambank sites impacted by agriculture by 60%.
2. Control erosion from 40% of the total length of streambank sites impacted by agriculture.
3. Install habitat structures in high management subwatersheds as specified in chapter 4.
4. Install fencing to restrict livestock access where specified in chapter 4.

Animal Lot Runoff

Runoff carrying a variety of pollutants from barnyards and other livestock feeding, loafing, and pasturing areas is a significant source of pollutants in the Middle Kickapoo River watershed. Inventory results show that 353 animal lots contribute 15,104 pounds of phosphorus on an annual basis. Most of the oxygen demanding pollutants and nutrients

associated with these operations drain via concentrated flow to the creeks in the watershed. Table 3-4 summarizes the animal lot inventory results.

Water quality objectives will be met if the following is achieved:

1. Reduce organic pollution from livestock wastes in high management subwatersheds by 60%.
2. Reduce organic pollution from livestock wastes in other subwatersheds by 50%.

Winter Spreading of Manure

The most significant water quality problems associated with the landspreading of livestock manure occur when wastes are spread on "critical" areas such as steeply sloped frozen ground, land in floodplains, or areas with shallow depth to groundwater. Estimates indicate that 317 landowners currently spread manure on 3717 critical acres. Runoff from these acres has a high potential to convey pollutants to the surface waters of the Middle Kickapoo River watershed.

Water quality objectives will be met by:

1. Landowners with Category I barnyards who are participating in the project will be required to implement and adhere to a SCS 590 nutrient management plan (see chapter 4).

Subwatershed Discussions

The Middle Kickapoo River watershed is divided into 14 subwatersheds. Current water resource conditions, nonpoint source pollutant loadings, potential uses, and water resource objectives vary between these subwatersheds. The subwatersheds are listed in table 3-5.

Kickapoo River

(From confluence with Brush Creek in Ontario to the confluence of West Fork Kickapoo near Readstown).

The Kickapoo River is a large, low gradient stream originating in Monroe County and flowing southward to the Wisconsin River in Crawford County. The entire stream is over 100 miles in length, but the portion in the priority watershed is 40.5 miles (6 miles in Richland County and 34.5 miles in Vernon County).

The Kickapoo is probably best known for its recreational value as an aesthetic canoe route. Each year hundreds of canoeists paddle from Ontario and through Wildcat Mountain State Park to various destinations downstream. The stream is also used for swimming and fishing.

table 3-1. Summary of Upland Sediment Loading by Land Use

	Sediment*	1,947	81	72	3	23	1	200	8	99	4	47	2	2	0	2,390	8
Billings Cr.	Acres	5,348	36	286	2	535	4	1,199	8	2,490	1	4,820	3	25	0	14,703	10
	Sediment	3,213	72	114	3	98	2	299	7	504	1	263	6	1	0	4,492	14
Brush Cr.	Acres	7,822	42	446	2	234	1	2,238	1	4,647	2	3,143	1	0	0	18,530	12
	Sediment	4,907	78	226	4	11	0	350	6	712	1	94	1	0	0	6,300	20
Camp Cr.	Acres	3,589	34	123	1	1,078	1	1,880	1	436	4	3,302	3	0	0	10,408	7
	Sediment	1,029	100	3	0	0	0	0	0	2	0	0	0	0	0	1,034	3
Chadwick Hl.	Acres	938	14	96	1	197	3	1,847	2	2,321	3	1,392	2	0	0	6,791	5
	Sediment	407	57	42	6	2	0	135	1	120	1	6	1	0	0	712	2
Cheyenne Vl.	Acres	2,320	32	92	1	257	4	1,089	1	626	9	2,777	3	12	0	7,173	5
	Sediment	1,628	89	46	3	2	0	98	5	34	2	20	1	0	0	1,828	6
Elk Cr.	Acres	2,929	29	114	1	1,334	1	1,371	1	715	7	3,454	3	35	0	9,952	7
	Sediment	937	75	47	4	13	1	96	8	101	8	60	5	0	0	1,254	4
Goose Cr.	Acres	1,243	32	35	1	174	4	504	1	313	8	1,599	4	0	0	3,868	3
	Sediment	401	100	0	0	0	0	0	0	1	0	0	0	0	0	402	1
Hay Val.	Acres	2,616	23	116	1	1,254	1	600	5	135	1	6,660	5	62	1	11,443	8
	Sediment	1,810	90	48	2	16	1	54	3	14	1	72	4	1	0	2,015	6
Jug Cr.	Acres	602	18	39	1	359	1	269	8	78	2	1,979	5	7	0	3,333	2
	Sediment	706	92	22	3	3	0	22	3	6	1	10	1	0	0	769	2
Otter Cr.	Acres	3,210	25	307	2	1,714	1	760	6	383	3	6,157	4	134	1	12,665	9
	Sediment	2,856	92	91	3	19	1	73	2	16	1	52	2	1	0	3,108	10
Viola Cr.	Acres	1,717	25	245	4	1,016	1	448	7	68	1	3,059	4	285	4	6,838	5
	Sediment	568	77	83	1	20	3	31	4	9	1	21	3	8	1	740	2
Warner Cr.	Acres	3,926	25	229	1	1,035	7	2,516	1	945	6	6,569	4	195	1	15,415	10
	Sediment	3,505	89	111	3	12	0	248	6	35	1	36	1	3	0	3,950	12
Weister Cr.	Acres	4,247	33	132	1	970	7	1,516	1	1,359	1	4,439	3	371	3	13,034	9
	Sediment	2,531	90	49	2	9	0	123	4	80	3	24	1	1	0	2,817	9
Totals	Acres	44,136	30	2,465	2	11,834	8	18,362	1	15,869	1	54,911	3	1,250	1	148,827	1
	Sediment	26,445	83	954	3	228	1	1,729	5	1,733	5	705	2	17	0	31,811	1

* Sediment is reported in tons/year

table 3-2. Summary of Sediment Loading by Source in Tons/Year

Subwatershed	Uplands	Gullies*	Streambanks**	Total
Bear Creek	2,390	2,027	852	5,269
Billings Creek	4,492	2,031	3,286	9,809
Brush Creek	6,300	2,556	6,220	15,076
Camp Creek	1,034	1,438	918	3,390
Chadwick Hollow	712	938	264	1,914
Cheyenne Vallley	1,828	991	1,010	3,829
Elk Creek	1,254	1,375	530	3,159
Goose Creek	402	534	52	988
Hay Valley	2,015	1,971	84	4,070
Jug Creek	769	460	97	1,326
Otter Creek	3,108	1,750	1,431	6,289
Viola Creek	740	945	0	1,685
Warner Creek	3,950	2,129	3,167	9,246
Weister Creek	2,817	1,801	2,059	6,677
Kickapoo River			6,782	6,782
total:	31,811	20,946	26,752	79,509

* A detailed inventory was not conducted; figures are estimates based on average size.

** This figure represents total streambank sediment loading. Chapter 4 discussion of controls focuses only on streambanks impacted by agriculture.

table 3-3. Inventory Results: Streambank and Habitat Degradation Sites

Subwatershed	Total # of all Degraded Sites*	Total # of all Degraded Agri. Sites	% Degraded Sites w/Agri. Impacts	Length of Degraded Sites (ft.)	Total Sedimen t Loss (tons/yr.)	Banks With Cattle Access (ft.)
Bear Creek	252	155	62%	11,020	852	4,945
Billings Creek	689	404	59%	98,858	3,286	66,582
Brush Creek	930	725	78%	145,672	6,333	125,620
Camp Creek	167	112	67%	9,720	946	5,460
Chadwick Hol.	56	56	100%	5,018	245	5,018
Cheyenne Val.	257	214	83%	20,653	1,016	13,654
Elk Creek	87	66	76%	18,780	530	14,060
Goose Creek	44	38	86%	2,850	51	2,420
Hay Valley	21	0	0%	1,035	84	-
Jug Creek	41	17	41%	2,035	97	765
Otter Creek	176	135	77%	16,025	1,431	7,660
Viola	0	0	-	-	-	-
Warner Creek	580	394	68%	45,281	3,269	24,161
Weister Creek	309	178	58%	31,729	2,815	14,397
Kickapoo	426	158	37%	68,300	6,782	16,006
total:	4035	2652	66%	476,976	27,737	300,748

* eroded, trampled, or slumped

table 3-4. Inventory Results: Barnyard Runoff Summary

Subwatershed	Total # of Yards	% of Total Yards	Phosphorus Load (lbs.)	% of Total Watershed Phos. Load
Bear Creek	17	4.8	703	4.7
Billings Creek	56	15.9	3,123	20.7
Brush Creek	103	29.2	4,628	30.6
Camp Creek	13	3.7	275	1.8
Chadwick Hollow	5	1.4	103	0.7
Cheyenne Valley	23	6.5	1,355	9.0
Elk Creek	20	5.7	479	3.2
Goose Creek	5	1.4	328	2.2
Hay Valley	14	4.0	653	4.3
Jug Creek	1	0.3	89	0.6
Otter Creek	23	6.5	807	5.3
Viola	3	0.8	45	0.3
Warner Creek	24	6.8	876	5.8
Weister Creek	46	13.0	1,640	10.8
total:	353	100.0	15,104	100

table 3-5. Subwatersheds of the Middle Kickapoo River Watershed

Symbol	Subwatershed Name	Location (County)
BE	Bear Creek	Vernon, Richland
BL	Billings Creek	Vernon, Monroe
BR	Brush Creek	Vernon, Monroe
CA	Camp Creek	Richland
CH	Chadwick Hollow	Vernon, Richland
CY	Cheyenne Valley	Vernon
EL	Elk Creek	Vernon, Richland
GO	Goose Creek	Richland
HV	Hay Valley	Vernon, Monroe
JU	Jug Creek	Vernon
OT	Otter Creek	Vernon
VI	Viola	Vernon, Richland
WA	Warner Creek	Vernon
WE	Weister Creek	Vernon