

Pecatonica River Watershed (DRAFT3)

For statewide planning purposes, the Pecatonica River Watershed is part of the Grant-Platte-Sugar-Pecatonica Basin. In Dane County, the greater Pecatonica River Watershed includes the Gordon Creek Watershed (30,792 acres) and Upper East Branch Watershed (1,172 acres). The entire watershed lies within the unglaciated Driftless Area. Land use data are presented in Tables 1 and 2.

There are no named streams within the Upper East Branch Watershed. Surface waters are limited to an intermittent stream and small tributary that carries treated municipal wastewater from the Village of Blue Mounds to Williams-Barneveld Creek, a trout stream in Iowa County.

Seven named streams bisect the broad ridge tops within the Gordon Creek Watershed. The streams are currently managed for trout and coldwater communities. All are classified as Rural Streams and sensitive to impervious surfaces runoff. Until recently, the streams were degraded from decades of cropland erosion, over pasturing and feedlot runoff. The Dane County Animal Waste Management Plan (1985) identified livestock operations as serious threats and impacts to the streams. Significant pollution problems and limited potential for successful water quality improvements were important reasons why the watershed did not rank high for Priority Watershed designation under Wisconsin's former Nonpoint Source Water Pollution Abatement Program. Three of the streams, German Valley Creek, Syftestad Creek and Pleasant Valley Creek, were listed on the 303d impairs waters.

Recent monitoring data and research demonstrated significant improvements in Gordon Creek Watershed streams (Marshall 2003). Syftestad Creek is now classified as coldwater communities and has been removed from the 303d list. German Valley Creek was reclassified as a trout stream and is expected to be removed from the 303d list soon. The primary reasons for these and other water quality improvements are linked to trends in agriculture and conservation efforts (Marshall et al. 2008).

While water quality problems linked to intensive agriculture were well documented in the 1980s, competition from global commodities markets was gradually changing agriculture in Wisconsin. There was a long term shift from numerous small farms to fewer larger farms. Coinciding with these trends, conservation practices, such as contour strip plantings, had also become more widespread. Total animal units declined, along with associated problems such as over-grazing woodland corridors, as the numbers of farms declined. Ultimately, BOD and nutrient loading to the streams decreased (Marshall et al. 2008). Not surprising, research had demonstrated that runoff and peak flow rates in Driftless Area streams declined as farm land use practices were gradually improving and intensive agriculture was declining on less productive lands (Gebert and Krug 1996). Additional research suggested that long term increased minimum and median flows in Driftless Area streams were primarily linked land use changes rather than increased precipitation rates (Juckem et al. 2008, Kochendorfer and Hubbard 2010).

As some indicators suggested that agricultural land uses had softened across the landscape, the 1985 Farm Bill ushered in a transformative conservation effort known as the Conservation Reserve Program or CRP. The CRP offered farmers USDA rental payments for retiring highly erodible croplands into long term grass cover. In areas such as the Gordon Creek Watershed, reaching 20% CRP enrollments by 2002, environmental benefits were significant including improved hydrology, reduced soil erosion,

reduced nutrient loading and increased wildlife habitat. Hydrology improved as surface runoff declined by 50% or more while infiltration increased inter-lateral groundwater flow to cold water streams. Sustained spring flow from perched hillside aquifers are important Driftless Area streams (Carter et al. 2010). Grass cover reduced phosphorus and sediment loading by 90% while the larger grassland tracts provide essential habitat for some of the most threatened bird populations in the United States, migratory grassland birds (Marshall et al. 2008). The relative high densities of these rare bird populations thrive in the Gordon Creek Watershed and surrounding Driftless Area watersheds in southwest Dane County and southeast Iowa County. This area is known as the Military Ridge Prairie Heritage Area (MRPHA) and lies within the greater Southwest Wisconsin Grassland and Stream Conservation Area (WDNR 2009). These projects focus on public-private partnerships designed to protect grasslands, prairie remnants, oak savannas, agriculture and water quality. The measured improvements in Gordon Creek Watershed streams reflect ecological and management connections between upland ridges and the streams that bisect them. In addition to environmental benefits, in some cases the CRP provided a social safety net that allowed struggling farmers to hold on their farms, and in return, provide important public benefits.

Without any direct management, fisheries in Gordon Creek Watershed streams gradually shifted from relatively diverse populations of eurythermal species to populations of stenothermal species more typical of ecologically healthy trout streams. Over the span of decades, species richness declined in the streams (Figure 1) while coldwater Index of Biotic Integrity scores greatly improved (Figure 2) (Marshall et al. 2008). There is a negative correlation between these two indicators of coldwater habitat. Healthy trout streams typically support low diversity of fish species adapted to living in perpetually cold water conditions (Lyons et al 1996). The changes that occurred in Gordon Creek Watershed streams also occurred in streams across MRPHA but did not occur in areas where CRP participation was substantially lower (Marshall 2008). Higher IBI scores generally occurred in watersheds where non-cropland uses, particularly grasslands, were higher (Figures 3 and 4)

State Special Concern redbreast dace had been collected in Gordon Creek and Syftestad Creek when eurythermal populations were dominant. The species is now considered extinct in the streams. While the loss of redbreast dace from the streams is unclear, a number of contributed factors may have influenced its distribution. It prefers cool water habitats while the streams now display cold water conditions. Redbreast dace is also vulnerable to the dominant species and top predator in the streams, brown trout. Finally, the occurrence of redbreast dace during the 1970s may have been a temporary artifact of more widespread habitat disturbances.

The combined long term hydrology/water quality improvements and management of trout streams in the Gordon Creek Watershed is a model of restoration. Improvements began at the watershed/landscape scale. Now, DNR, Dane County Department of Land and Water Resources and Trout Unlimited have fine-tuned the restoration at the stream corridor level. As the overall environmental conditions improved in the streams, numerous stream habitat improvement projects are now in various stages of planning and completion. These efforts have been reversing the long term habitat loss of box elder growth over incised channels with eroding stream banks.

The changes in agriculture and streams in the Gordon Creek Watershed is not the end of the story. Since 2002, anticipation of ethanol production and expectation of high corn prices precipitated significant withdrawals from the CRP. At a few locations, factory style farms replaced former CRP lands with very high animal unit densities that can have catastrophic effects on water quality (2005 manure spill in the West Branch Sugar River). In other areas, CRP lands were converted to low density housing. While impervious surfaces do not typically increase substantially under this form of development, potential impacts linked to surface runoff and groundwater contamination cannot be ignored. Low density development also destroys habitat for threatened migratory birds that require large tracts of un-fragmented grassland and can destroy scenic views that are important for the local tourism economy; undermining the goals of MRPHA and Southwest Wisconsin Grassland and Stream Conservation Area (WDNR 2009).

Water quality and biological monitoring will continue in the watershed as DNR and local partners assess stream responses to local habitat restoration projects. Additional monitoring will involve watershed scale biological, chemical and physical data collections as part of a new pilot project (involving USEPA, WDNR, and Midwest Biodiversity Institute) that will develop sampling designs to improve monitoring strategies.

Table 1: Upper East Branch Watershed Characteristics

Resource Characteristics	In Acres
Hydric soils	0
Wetlands	0
Agriculture	832
Commercial	2
Institutional/Governmental	5
Industrial	11
Open Water	0
Vacant Land or Under Construction	45
Outdoor Recreation	38
Residential	103
Transportation, utilities etc.	101
Woodland	23
Total Watershed Area	89,791
Dane County Portion	1,172

Dane County State of the Waters Report

Table 2: Gordon Creek Watershed Characteristics

Resource Characteristics	In Acres
Hydric soils	1,293
Wetlands	394
Agriculture	20,534
Commercial	1
Institutional/Governmental	10
Industrial	46
Open Water	1
Vacant Land or Under Construction	3,092
Outdoor Recreation	81
Residential	270
Transportation, utilities etc.	906
Woodland	5,831
Total Watershed Area	49,260
Dane County Portion	30,792

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Figure 1: Species Richness changes after CRP Enrollments in Southwest Dane County and Southeast Iowa County. Low species richness reflects healthy trout streams.

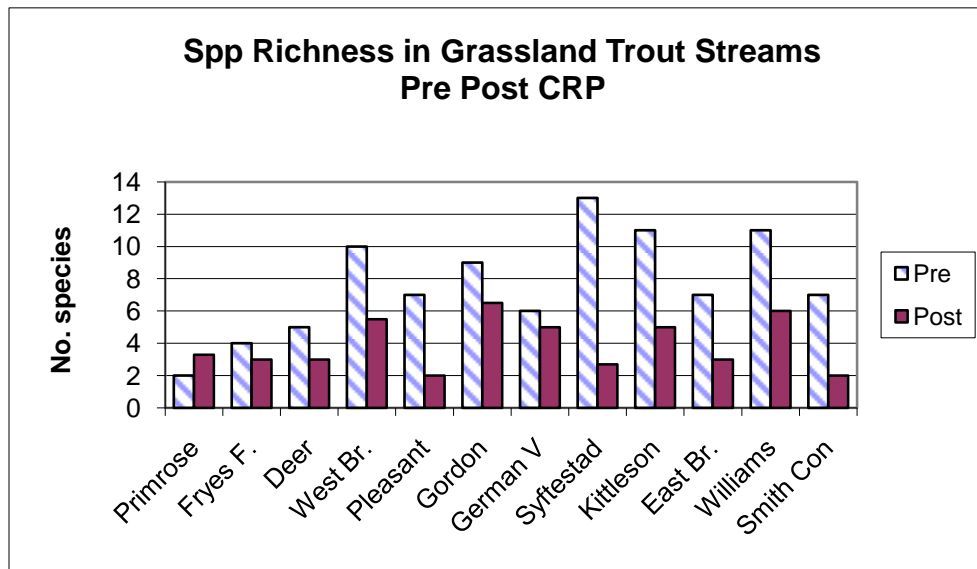


Figure 1: Cold water Index of Biotic Integrity (IBI) Scores for Southwest Dane County and Southeast Iowa County before and after CRP enrollments. IBI "good" range = 60-80.

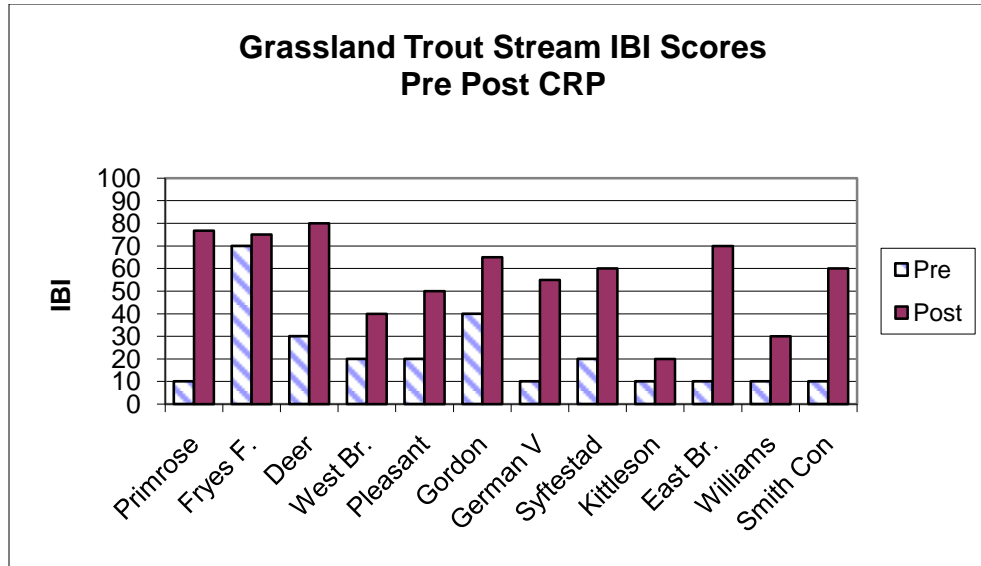


Figure 3: Higher IBI scores (left side) occurred in watersheds with lower intensity agriculture.

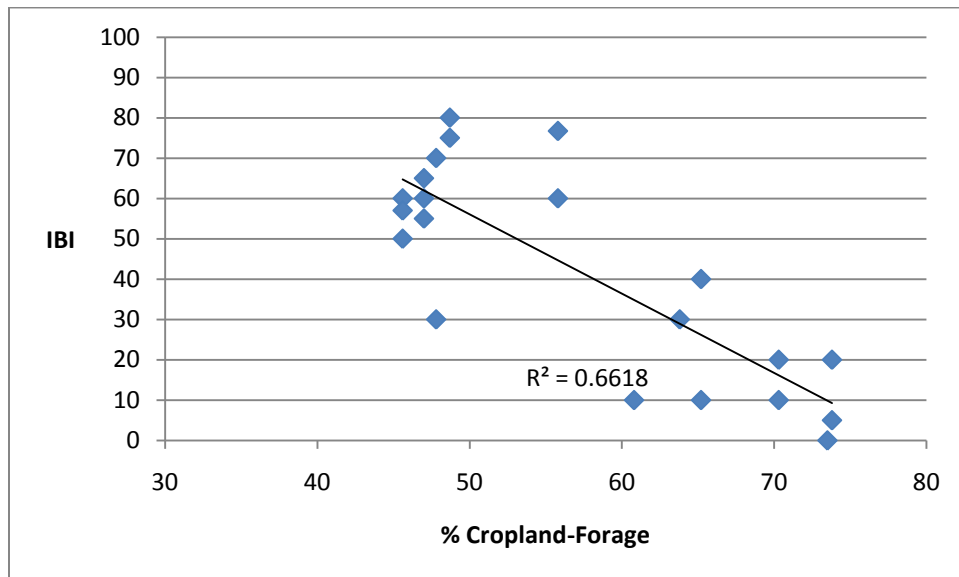
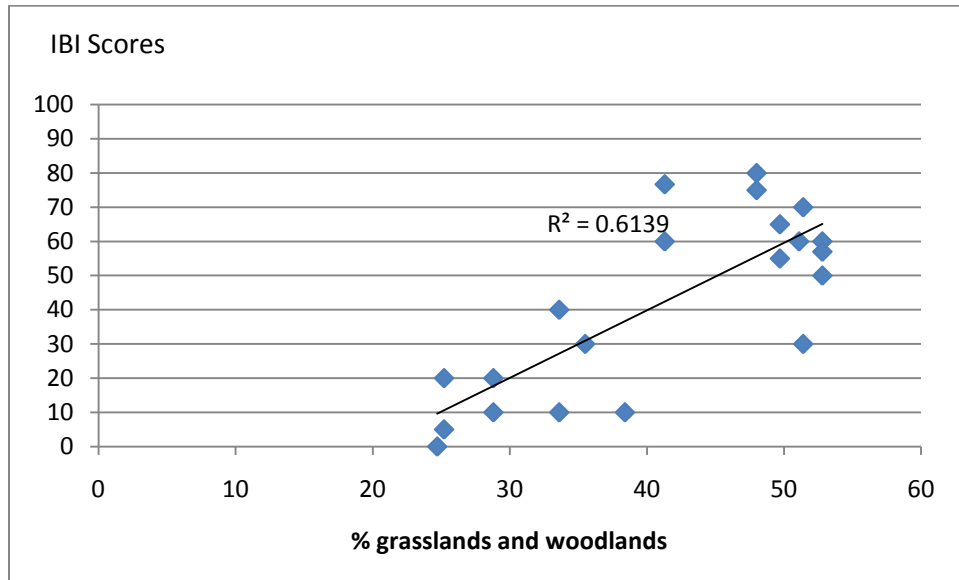


Figure 4: Lower IBI scores (left side) coincided with lower grasslands and woodlands



Gordon Creek

Gordon Creek (WBIC 907300, also known as Blue Mounds Branch and Big Spring Creek) arises in Section 8 of Blue Mounds Township and flows south for about six miles to the confluence with German Valley Creek. It is considered one of the premier trout streams in Dane and Iowa counties and has been the focus of extensive habitat restoration in recent years. In Dane County Gordon Creek is classified as Exceptional Resource Waters (ERW) and has been managed as a Class II trout stream for decades. The recent interest in the creek coincided with findings that it had significantly improved. Figure 5 demonstrates how the fish community changed over the years, from eurythermal populations to stenothermal/ environmentally intolerant fish populations more typical of healthy trout streams. Gordon Creek previously supported State Special Concern reddsides but the current cold water temperatures and brown trout predation present survival obstacles for the rare fish. Figure 6 reveals improved cold water IBI scores over time with the best scores beginning in 2001. In 1994, the IBI score reflected poor cold water habitat eight years after CRP signups began. The poor coldwater conditions may have indicated a lag time for ecosystem response to improved conditions and/or lower numbers of CRP participants at that time. Figure 7 displays daily maximum mean temperatures and sustained cold water habitat based on Onset Hobo data loggers. Hilsenhoff Biotic Index scores from samples collected in 1994 through 2002 indicated very good water quality (HBI range 2.39-4.96, mean = 3.62). The highest HBI score (lowest water quality) coincided with a manure spill that caused a major fish kill. The favorable HBI score during that pollution event reflected macroinvertebrate escape into the groundwater fed hyporheic zone. The macroinvertebrate community in Big Spring-Gordon Creek typically supports abundant stonefly populations, primarily *Isoperla signata*).

German Valley Creek

German Valley Creek arises in Section 10 of Blue Mounds Township and flows about seven miles to the confluence with Gordon Creek. Until recently, GVC had never been managed for trout due to chronic low stream flows, poor habitat and poor water quality. However, while it has been more degraded than Gordon Creek, German Valley Creek followed a similar path toward restoration (Figure 5). GVC now supports primarily stenothermal cold water fish species and the trout stream classification reflects these fish community changes and angler opportunities. Several miles of the stream habitat was restored along with easements for public fishing. GVC is still listed as 303d impaired by it is expected to be removed from the list soon to reflect the significantly improved water quality and habitat and sustained brown trout population. The best trout habitat is located in the lower reaches where enough spring flow sustains habitat and cold water temperatures. Hilsenhoff Biotic Index scores ranged from 2.91 (excellent water quality) to 5.15 (good water quality) during the period from 1994 through 2002.

Figure 5: Fish community changes in Gordon Creek

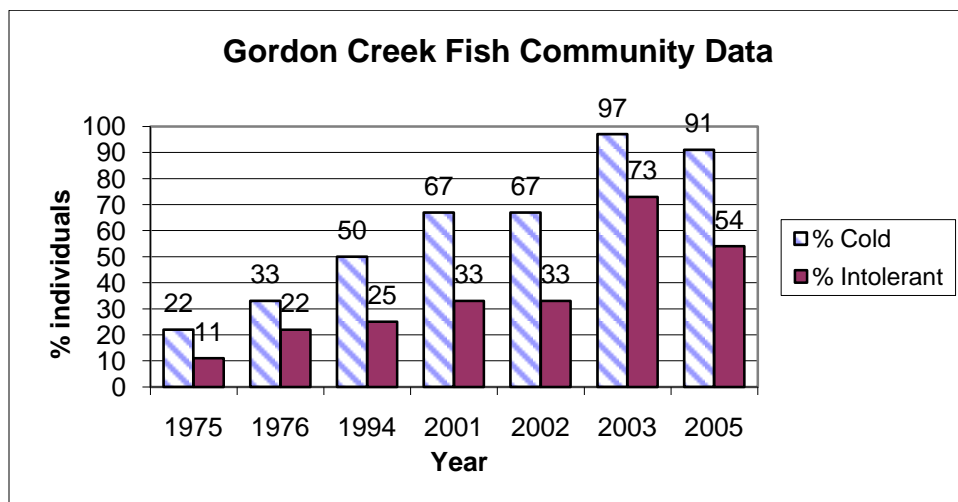


Figure 6: Changes in cold water IBI scores over time in Gordon Cr, German Valley Cr and Syftestad Cr

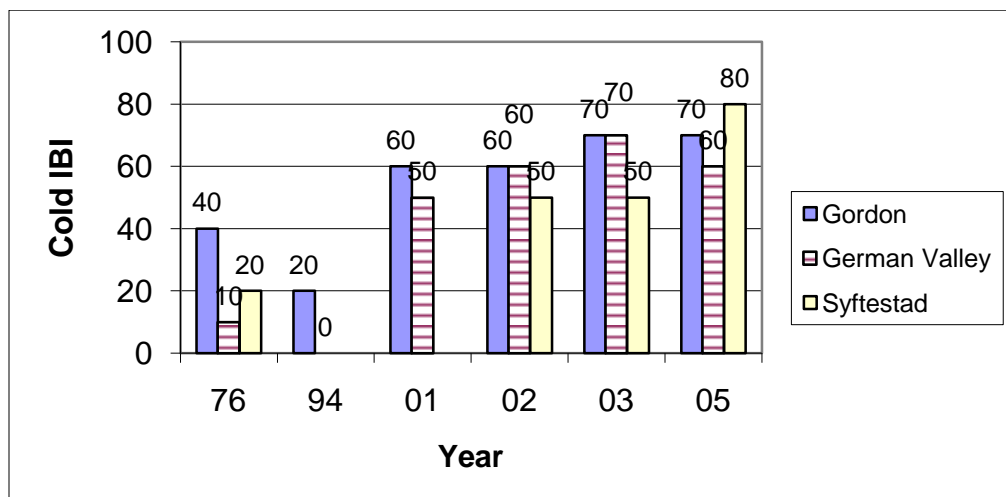
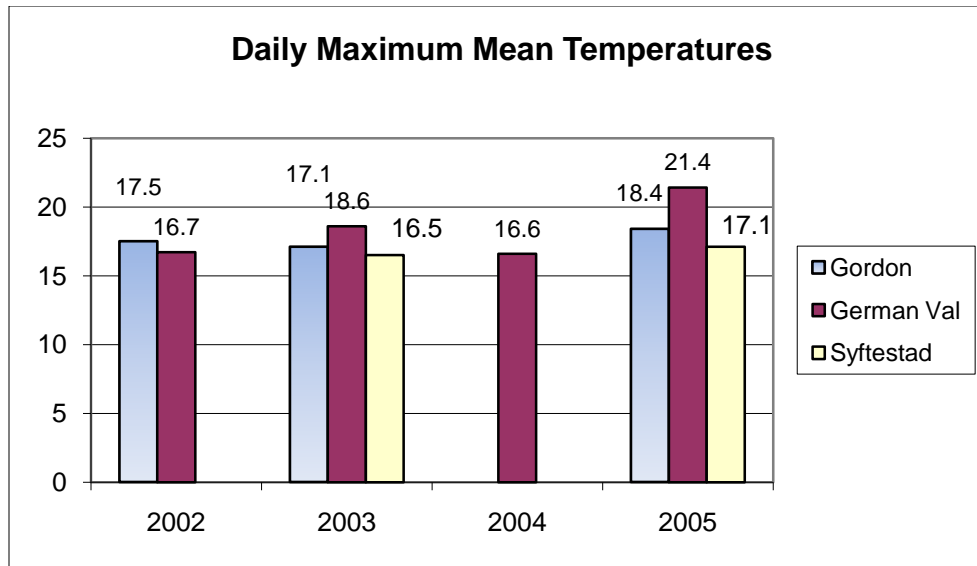


Figure 7: Summary of continuous water temperature data for Gordon Creek, German Valley Creek and Syftestad Creek.



Syftestad Creek

Syftestad Creek (also known as Daleyville Branch) is a small stream that arises in Section 25, Perry Township and flows south for about four miles to the confluence with Kittleson Valley Creek. Until recently, Syftestad Creek was considered a degraded forage fish stream due to habitat problems and polluted runoff in the watershed. It was removed from the 303d list in 2006 to reflect recent data that reveal conditions favorable for trout and cold water communities. Syftestad Creek supported 13 species of fish in the 1970s, including the State Special Concern redbreast dace. The rare fish disappeared from the stream along with most of the other species that do not thrive in sustained cold water habitats. Figures 6 and 7 display cold water IBI changes over time and continuous data logger water temperature summaries. Consistent with the other trout streams in the area, HBI values reflected very good water quality in Syftestad Creek.

Kittleson Valley Creek

Kittleson Valley Creek arises in Section 25 of Perry Township and flows west to the confluence with Gordon Creek in Iowa County. The stream has been a classified trout stream for decades but had been plagued with severe bank erosion and livestock grazing. Kittleson Valley Creek improved along with other MRPHA streams more recently. In 2009 WDNR baseline fish shocking surveys revealed that parts of Kittleson Valley Creek supported typical trout stream fish species; primarily brown trout and mottled sculpin. IBI scores ranged from 30 to 70 from 2006-08 with a mean score of 57 (N=6). A 2008 HBI sample indicated "excellent" water quality with a score of 3.19. Kittleson Valley Creek and tributaries Pleasant Valley Creek and Lee Creek, are part of a pilot study known as the Wisconsin Buffer Initiative. The concept is based on targeted croplands and pastures that likely contribute the largest amounts of

nutrients and sediment to the streams. Lee Creek was originally classified as a trout stream when Kittleson Valley Creek was classified in 1980 (Wisconsin Trout Streams “Blue Book”).

Pleasant Valley Creek

Pleasant Valley Creek is a small stream that arises in Section 3 of Perry Township and flows south for about four miles to the confluence with Kittleson Valley Creek. Pleasant Valley Creek is listed as 303d impaired and is a key focus of the Wisconsin Buffer Initiative. HBI scores from macroinvertebrates collected in 2003-04 indicated “fair to fairly poor” water quality and ranged from 5.97 to 7.46. More recent biological indicators suggested that the stream likely improved with cold water IBI scores ranging from 30 (fair) to 70 (good)(mean =50, n =11). The dominant species were brown trout and mottled sculpin. Six flow rates, measured in 2008, averaged less than 0.5 cubic feet per section approximately one mile above the confluence with Kittleson Valley Creek.

Lee Creek (York Valley)

Lee Creek originates in Green County and flows northward to Kittleson Valley Creek. The small trout stream displays “fair” coldwater habitat (IBI=30) near Tyrand Road but improves to “good” (IBI=60,70) trout stream habitat from Lee Valley Road to the confluence with Kittleson Valley. An HBI macroinvertebrate sample (1.46) collected in 2008 indicated “excellent” water quality.

Table 3: Fish and Aquatic Life Designations

Waterbody	2000 Impervious Cover	Planned Impervious Cover	Use	Use Potential	Codified Use
Gordon Cr.	5.11%	5.46%	Cold		ERW
German Valley Br.	4.33%	4.48%	Cold		303(d)
Jeglum Valley Br.	2.94%	2.94%	Cold		
Kittleson Valley Cr.	3.38%	3.38%	Cold		
Pleasant Valley Br.	3.62%	3.62%	wwff	Cold	303(d)
Syftestad Cr.	3.47%	3.47%	Cold		
York Valley Cr. (Lee Cr.)	3.07%	3.07%	Cold		

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