

Missouri
Department of
Natural Resources

DRAFT LITTLE SAC RIVER TMDL
PUBLIC COMMENTS

Public Notice
Dec. 30, 2005 – March 30, 2006

**Little Sac River
WBID #1381**

Greene and Polk counties, Mo.

Missouri Department of Natural Resources
Water Protection Program
PO Box 176
Jefferson City, MO 65102-0176
800-361-4827 / 573-751-1300

RECEIVED

WATER QUALITY

WATER PROTECTION

January 4, 2006

1507 E. Price Street
Springfield, MO 65804

Department of Natural Resources
Water Pollution control Branch
Water Quality Monitoring and Assessment
P. O. Box 176
Jefferson City, MO 65102-0176

RE: TMDL for Little Sac River

To Whom It May Concern:

I have reviewed the draft TMDL for the Little Sac River. I lived in the Little Sac River watershed from 1985 through 1993 and periodically visit the area at present.

The findings that the primary source of the fecal coliform contamination found being geese is most interesting. The draft TMDL does raise several questions that need to be clarified. The exact species of geese being discussed needs to be more clearly identified. I have personally observed the resident giant Canada goose in the watershed in significant numbers year round, particularly in and around Ritter Springs Park. I must disagree with the statement on page 5 that "a small winter population of resident Canada geese exists...". Resident giant Canada geese are present in the watershed year round.

I have observed the migratory Canada goose in the Little Sac arm of Stockton Reservoir during their annual migrations. I have observed them flying over the upper reaches of the Little Sac River in northern Greene County during their migrations, but have not observed them on the upper river or its tributaries. My personal observations differ from the TMDL conclusion that "migratory" geese are the prime source of fecal coliform because I have observed more resident giant Canada geese in the upper and middle watershed than migratory geese.

Does the DNA source-tracking method used identify both migratory Canada goose DNA and resident giant Canada goose DNA? Does it differentiate between the two? Management techniques to control goose populations should be very different for the migratory versus resident geese, so the species of concern needs to be clearly identified.

Sincerely,



David Cavender

FAPRI
At the University of Missouri
Food and Agricultural
Policy Research Institute

101 Park DeVillie Drive, Suite E
Columbia, MO 65203
Phone: (573) 882-3576
FAX: (573) 884-4688
www.fapri.missouri.edu

Mr. David Cavender
1507 E. Price Street
Springfield, MO 65804

February 23, 2006

Dear Mr. Cavender,

Ms Clark, from the Missouri Department of Natural Resources (MDNR), has communicated with me regarding the comments you sent her about the Little Sac Total Maximum Daily Load (TMDL).

The DNA bacterial source tracking included a set of patterns from geese feces collected in the Little Sac watershed, more specifically in different parks in North Springfield. In addition, our technician only collected feces after it was observed being deposited on the ground by a goose. No feces were collected without seeing the animal defecating. However, the term "migratory" in our report is probably misleading and I will propose to remove it as the collected feces represent all species present without any attempt to focus on migratory geese. In addition the DNA source tracking method, as we performed it, does not differentiate between migratory geese and resident geese.

The ponds and lakes in these parks are indeed attracting geese populations, migratory and resident. These are, as you suggest, spots where geese tend to congregate. I have listed control activities suggested by the Missouri Department of Conservation (MDC) to address these critical spots (habitat modification, exclusions, ...) and referred to the MDC publication on the topic. My intent is to make local organizations aware of the problem caused by the geese population in the watershed and the impact it has on the bacterial loading of the stream as demonstrated by the bacterial source tracking. I am not certain whether the management techniques are similar for all species or not.

Thank you for your comments. Please contact Claire Baffaut (573) 882-1251 or Ms Clark if you have any additional questions.

Sincerely,

Claire Baffaut
FAPRI
Program Director - Watersheds



January 20, 2006

*TO: Phyllis Anne P. Mary C.
1/25/06*

11:00 AM
JAN 24 11:00
WATER PROTECTION

Missouri Department of Natural Resources
Water Protection Program
Water Quality Monitoring and Assessment Section
P.O. Box 176
Jefferson City, MO 65102-0176

RE: Preliminary comments on Public Notice of Draft Little Sac River Fecal Coliform TMDL and request for 60-day extension

We appreciate the opportunity to review and comment on the draft Little Sac River Fecal Coliform total maximum daily load (TMDL). Upon preliminary review, the City has significant concerns relating to the scientific accuracy of the study upon which the TMDL is based as well as the feasibility and achievability of the specific proposed goals outlined in the report. The City of Springfield has retained two expert consultants, Wright Water Engineers, Inc. and MEC Water Resources, to assist the City in reviewing the draft TMDL. Because of the complexity of this document and the substantial impacts the final TMDL could have on the City of Springfield and its residents, the City and its consultants will need more time to provide comments as well as scientifically substantiated alternatives.

Unlike the TMDL for the James River, this draft TMDL includes a calculation of the urban runoff predicted daily loading. The inclusion does not seem to be substantiated by the study in which the TMDL is based. The final calculation for the urban runoff daily loading will have substantial impact on the City, potentially leading to non-compliance and an increase for City ratepayers. This impact further supports the need for an adequate public comment period.

Additionally, based on this loading, urban runoff appears to be subsequently assigned a disproportionate share of the estimated necessary load reduction. This could: 1) be extremely difficult to technically achieve, 2) result in non-compliance, 3) have major impacts on City ratepayers, and 4) not meaningfully improve water quality or reduce human health risk.

The City's principal technical concern is that the data from the Bacterial Source Tracking (BST) study is over-interpreted for the purpose of developing TMDL remedies. It does not provide adequate data for load allocations or assignment of responsibility for the loads. The most evident example of this is the fact that "unknown sources" comprise

DEPARTMENT OF PUBLIC WORKS

840 Boonville Avenue, P.O. Box 8368 Springfield, Missouri 65801-8368

phone: (417) 864-1900

homepage: www.springfield.missouri.org/gov e-mail: city@ci.springfield.mo.us

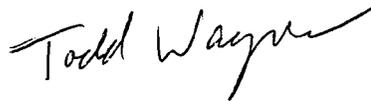
more than 50% of fecal coliform at FR129 and 27% at RD215. These results would seem to imply that a better characterization of the sources is important if the BST is to be used as the basis of a TMDL.

Another key concern is the characterization of springs. While the identification of springs as the dominant sources of fecal coliform during base flows is reasonable based on the modeling results, it is not very helpful for identifying the actual sources of the bacteria and developing recommended controls. Control of fecal coliform at the springs would require expensive structural treatment systems. More accurate identification of the fecal coliform animal sources will likely lead to more efficient preventative best management practices (BMPs).

These concerns provide important reasons for requiring follow-up studies before writing a TMDL that includes load allocations and assignment of responsibility for the loads. We feel that for these reasons, as well as other concerns, the Little Sac River TMDL should be a phased TMDL in which the data of this study serves as the first phase and basis for further studies. Later phases could also target E. coli indicator bacteria, which is a better indicator of pathogens and will ultimately replace the fecal coliform criterion utilized in the proposed TMDL.

We request that the public comment period be extended sixty (60) days due to the many additional concerns beyond those included here from our preliminary review. We request this extension to allow adequate time for a thorough technical analysis of the study as well as an accurate analysis of the cost implications of the proposed goals of the study. We also feel it would be helpful to meet with the department to discuss our concerns and are open to doing so either before or after the close of the public comment period, whichever would be appropriate. Please feel free to contact me at (417) 864-1901. Thank you.

Sincerely,



Todd Wagner, PE
Principal Storm Water Engineer
Storm Water Services Division

C: Law Department
Public Works File



Matt Blunt, Governor • Doyle Childers, Director

DEPARTMENT OF NATURAL RESOURCES

www.dnr.mo.gov

January 24, 2006

Mr. Todd Wagner, PD
Storm Water Services Division
City of Springfield
840 Boonville Avenue
Springfield, MO 65801-8368

RE: Little Sac Total Maximum Daily Load

Dear Mr. Wagner:

We received your request for an extension to the comment period for the draft Total Maximum Daily Load (TMDL) for the Little Sac River. An extension has been granted until March 30, 2006 for comments on this TMDL.

Should you wish to meet with staff during the remainder of the comment period, please contact me at Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, Missouri 65102 or at (573) 526-1002 to arrange an appropriate date and location for the meeting.

Sincerely,

WATER PROTECTION PROGRAM

A handwritten signature in cursive script that reads 'Mary Clark'.

Mary Clark
Water Protection Program

MC/lsm

c: Ms. Claire Buffaut, FAPRI



January 26, 2006

RECEIVED
2006 JUN 30 PM 1:45
WATER PROTECTION PROGRAM

Missouri Department of Natural Resources
Water Protection Program
Water Quality Monitoring and Assessment Section
P.O. Box 176
Jefferson City, MO 65102-0176

RE: Comments on Public Notice of Draft Little Sac River Fecal Coliform TMDL

The City of Springfield previously submitted preliminary comments on the draft Little Sac River Fecal Coliform total maximum daily load (TMDL) as well as a request for an extension of the public comment period. We appreciate the department granting our extension request and the willingness of department staff to meet with us to discuss our concerns. Please accept these additional comments regarding the TMDL. We hope these will assist in making our forthcoming meeting more productive. Our preliminary comments are incorporated here again as they constitute some of our most significant concerns.

We appreciate the tremendous amount of work that the Food and Agricultural Policy Research Institute (FAPRI), the department and contributing partners have put into this study and TMDL development. The City of Springfield has demonstrated its commitment to protecting and enhancing the region's water resources in many different ways. We continue this commitment here and share in the mutual goal of developing a plan to protect the Little Sac River based on sound science. We feel that the following general and specific comments provide important reasons that the Little Sac River TMDL should be a phased TMDL in which the data of this study serves as the first phase and basis for further studies. We believe the proposal to allocate load reductions is premature and should be delayed until further studies are completed. Several other TMDLs, including the Shoal Creek TMDL (2003) and the James River TMDL (2001), are based on a phased approach. The Shoal Creek TMDL contains the statement, "All Missouri TMDLs are phased;" however, the Little Sac River TMDL does not indicate that it is a phased approach.

General Comments

1. Data from the Bacterial Source Tracking (BST) study is over-interpreted for the purpose of developing TMDL remedies. It does not provide adequate data for load allocations or assignment of responsibility for the loads. The most evident example

DEPARTMENT OF PUBLIC WORKS

840 Boonville Avenue, P.O. Box 8368 Springfield, Missouri 65801-8368
phone: (417) 864-1900

homepage: www.springfield.missouri.org/gov e-mail: city@ci.springfield.mo.us

of this is the fact that “unknown sources” comprise more than 50% of fecal coliform at FR129 and 27% at RD215. These results imply that a better characterization of the sources is important if the BST is to be used as the basis of a TMDL. The TMDL relies heavily on the BST results, but the BST is not adequate for this application. While the report acknowledges its limited data set, it does not take these limitations into account adequately when drawing conclusions concerning load allocations and responsibilities.

2. The report does not reference any U.S. Environmental Protection Agency (EPA) documents in its bibliography, several of which are important for TMDL development, in particular: *Protocol for Developing Pathogen TMDLs*, 1st Edition, EPA 841-R-00-002, January 2001, and *Microbial Source Tracking Guide Document*, EPA 600-R-05-064, June 2005. The importance of these documents for the FAPRI report is that they provide protocols that were not always applied in the FAPRI study. In general, lack of sufficient data is the reason for deviating from EPA protocols, but the FAPRI document neither acknowledges these protocols nor discusses the consequences of not following them. Additionally, EPA’s *Microbial Source Tracking Guide Document* emphasizes that BST is an emerging scientific approach to source species identification, but is not required for TMDL development. BST should be used as a tool to provide choice of remedies and should not drive load allocations and responsibilities.
3. The segment of the Little Sac River on the 303(d) list is 29 miles long but was sampled at only two locations in this study, only one of which had flow data. For comparison, the TMDL for the James River, though the impaired segment is 58 miles, considers historic data from 26 sampling sites and is being monitored at 12 sites during phase one. Particularly with respect to contributions from specific springs, additional monitoring at key interim locations would help to refine source control target areas.
4. The information sheet on the Little Sac River currently posted on the department website lists the United States Geologic Survey (USGS) and Missouri Department of Natural Resources (MDNR) data from 1999-2003 and states, “Geometric means of all portions of Little Sac and tributaries are less than the 200 colonies/100ml standard during the recreational season (April – Oct) and are therefore judged to be in compliance with that standard. Recommendation: delete L. Sac River from 2004 303(d) list.”

However, these historic data and the recommendation were not considered in this TMDL. In fact, page 4 of the study inaccurately represents these data with the following statement: “Various monitoring studies (Smith, 2002; MDNR, 2002) and the data collected during this study show that the concentrations have been and remain elevated beyond acceptable levels for recreational purposes.” These data should be accurately considered in the development of a TMDL for the Little Sac River. Interestingly, the highest instantaneous fecal coliform load reported by Smith

(2002) was 3×10^6 colonies per day compared to the predicted baseflow modeled load within the TMDL of 5×10^{11} colonies per day. Therefore, bacteria loading estimates within the TMDL have likely been overestimated. Data collected by USGS, MDNR, and FAPRI are inconsistent and lead to opposing conclusions as to the impairment of the stream.

5. Concerning the Soil and Water Assessment Tool (SWAT) used in the study:
 - a) Little detail is given concerning the reasons for using the SWAT Model. More detailed descriptions of its strengths, weaknesses, and how deficiencies are accommodated should be included. SWAT's inability to model transport through karst features and to simulate fecal coliform accumulation and wash-off from impervious areas appear to be weak points.
 - b) Limited hydraulic and water quality model calibration information is provided. The researchers show that the model is calibrated to ten-year average discharge and flow exceedance probability. In addition, model calibration for bacteria was displayed as a percent exceedance plot. However, transport and loading simulation accuracy is not documented for individual runoff events or flows averaged over less than a ten-year period. A depiction of predicted bacteria and flow data similar to that presented as Figure 3 is requested. Without this documentation, this model should be tentatively considered uncalibrated and used carefully for implementation planning. Uncertainty analyses may be useful to assess the model's utility in implementation planning and risk analysis.
 - c) Related to spring hydrology data, the study states, "While there are some data about these springs, the information is not as thorough as would be needed to build an accurate model of the watershed hydrology." The study relied upon average discharge values or averages of flow ranges provided by the Geologic Survey and Resource Assessment Division of MDNR. This indicates that accurate calibration of the SWAT model is not possible, suggesting that it should not be used for TMDL development.
 - d) Spring water quality should be carefully evaluated prior to significant expenditures to mitigate these sources. The study uses arithmetic averages of fecal coliform and *E. coli* data for point sources (WWTP discharge and presumably springs). However, these data do not exhibit a normal distribution, resulting in likely mischaracterization of their influences. For example, differences between arithmetic and geometric means ranged from 150% to 18,000% among individual springs. The analysis of these data as geometric means (2 to 150 col./100 mL) suggests that spring discharges meet or barely exceed the applicable *E. coli* water quality criterion (126 col/100 mL). Spring arithmetic means are apparently heavily influenced by high bacteria concentrations during wet weather conditions due to the interconnection with the surface through karst features. Inappropriate characterization of central tendencies is particularly problematic for evaluations of spring influences during baseflow conditions.
 - e) While the model identifies springs as the dominant sources of fecal coliform during base flows, the study does not identify the actual sources of the bacteria. Control of fecal coliform at the springs would require expensive structural

treatment systems. More accurate identification of the fecal coliform animal sources will help in developing recommended controls and likely lead to more efficient preventative best management practices (BMPs). Future dye studies may be helpful in identifying source areas should these or similar studies not exist.

- f) A sensitivity and/or uncertainty analyses should be performed on fecal coliform production rates by wildlife and livestock. The fecal coliform production rates utilized within the model suggests that an individual goose produces ten times more fecal coliform than a beef cow. However, Hussong et al.(1979) found that geese produce three orders of magnitude (1000 times) less that the citation used within the TMDL.
 - g) The study did not include inputs from septic tanks in the SWAT Model because the BST results showed only 2% of the isolates at each site were associated with septic effluent. However, the Source Assessment section of the study estimates there are approximately 5,000 failing septic tanks in the Little Sac River watershed. It is suggested in the Implementation section on page 42 that the BST results may have underestimated the loading from septic tanks, indicating that septic tanks may account for the large amount of unknown sources. It seems then that input from septic tanks should have been included in the model.
 - h) The previously mentioned modeling questions could have been addressed by following the EPA guidance pertaining to model development, evaluation, and application for regulatory purposes (Pascual et al. 2003).
6. The TMDL needs a discussion of milestones to be met for determining if control actions are being implemented, if standards are being attained, and if modifications are needed. (Development, implementation, monitoring, re-assessment, and revision of BMPs.)
 7. In several instances, bacteria data are consistently evaluated with respect to arithmetic means rather than geometric means, which serve as the bases for bacteria criteria. Bacteria data are typically log normally distributed; therefore, application of arithmetic means are inappropriate for characterizing central tendencies. Instances include the spring data in Table 8, the Northwest WWTP input discussed on pages 21–22, and the load capacity in Tables 15 and 16.
 8. The study relies upon the fecal coliform indicator, which is a poor indicator of public health risk during whole body contact recreation and will be ultimately replaced with *E. coli* water quality criteria. If this study were to serve as the first phase of the TMDL as we suggest, later phases could target *E. coli* bacteria.
 9. Unlike the phased TMDL for the James River, this draft TMDL includes a calculation of the urban runoff predicted daily loading. The inclusion does not seem to be substantiated by the study on which the TMDL is based. The final calculation for the urban runoff daily loading will have substantial impact on the City, potentially leading to non-compliance and an increase for City ratepayers.

10. Based on the urban runoff predicted daily loadings of 2% and 6% at FR129 and RD215 respectively, urban runoff appears to be assigned a disproportionate share of the estimated necessary load reduction in the Implementation section. Scenario 3 on page 39 includes a 50% reduction of urban storm runoff contributions; however, no scenario is evaluated that includes reducing the contribution from storm runoff in rural areas even though sources in rural areas represent a larger portion of the surface loadings. As stated on page 34, “The main sources during storm flow conditions are the surface loadings: cattle and other unknown surface loadings (76 to 81%), goose (18%), and urban pollution 2% at RD215, 6% at FR129.” It is noted on page 32 that the unknown surface loadings referred to in the previous statement include the loading assigned to horses.

A 50% reduction of urban storm runoff contributions would: 1) be extremely difficult to technically achieve, 2) have major impacts on city ratepayers, and 3) not meaningfully improve water quality or reduce human health risk. Scenarios should be considered that are consistent with the data. A scenario proposing a reduction in urban runoff should only be considered in addition to a reduction in other storm runoff sources and each considered proportionately based on the data. Additionally, the role of urban runoff should be emphasized in the discussion on pages 39-40 subsequent to the role of the other sources indicated in Tables 18 & 19 and in the statement on page 34.

Specific Comments

1. Page iv, Executive Summary: “If the spring contamination is reduced by 85% and the goose population by 30%, it is expected that fecal coliform concentrations in the little Sac River will meet the water quality standard 70% of the time.” It is unclear how this hypothesis was concluded or how it relates with attaining water quality standards. We suggest that this is clarified by indicating the data set and calculation used to come to this conclusion. Additionally, recreational season fecal coliform geometric mean of the model output should be compared to the water quality criterion.
2. Page iv and Page 47: The Summary and Conclusions section is inconsistent with the Executive Summary on page iv. On page 47 it states that out of the sources that were identifiable based on DNA analyses, 40% was from either cattle or horses, 30% was from geese, and 30% was from sewage; however, the Executive Summary does not mention the contribution of horses or cattle, only stating that the highest loads come from unknown sources, geese and humans. For consistency, the contribution of cattle and horses should be included in the Executive Summary. Also, page 47 states that loads carried during storm flows need to be reduced by 90%. This is inconsistent with the proposed needed reductions included in the Executive Summary.

3. Page 4: The Source Assessment does not include dog and deer sources, which seem easily collectable.
4. Page 5: Table 1 uses 1984 as a break in the age structure of septic tanks while the previous paragraph uses 1989.
5. Page 6, second paragraph under Storm runoff from urban areas: “Urban storm runoff has been monitored...” should be changed to “Streams have been monitored...” While the City does also monitor storm runoff as part of its NPDES permit, this monitoring activity is not what is being referred to when describing the sampling of Pea Ridge Creek. This is the in-stream monitoring activity required by the permit.

The value of 360 colonies/100ml for the “average concentration of the three samples collected during dry weather in 2004” should be 440 colonies/100ml if based on the sampling results of 80, 500, and 300 colonies/100ml for the Pea Ridge Creek sampling site as reported in the 2003-2004 NPDES permit report. It should be noted that the sampling result of 80 colonies/100ml was taken on 11/10/03; therefore, the sentence should be altered to say 2003-2004 rather than just 2004.

6. Page 8: In regard to Figure 3, the second paragraph states, “Concentrations higher than 2000 colonies/100 ml are frequently associated with increased flow, even when the flow increase is small or moderate.” While this statement appears accurate, it is also important to note that the highest fecal coliform counts do not correlate with high river flows. For example, three samples collected in August and September at FR129 during relatively low flows were over 1000 colonies/100ml. Two samples collected in August and October at RD215 during relatively low flows were over 5000 colonies/100ml. Additionally, presenting fecal coliform concentrations on a logarithmic scale in Figure 3 would allow a horizontal line at 200 col/100 ml to easily distinguish compliant and exceedance values, as well as keep the peak values on scale.
7. Page 8: Tables 2 and 3 should show the number of data points included in the geometric and arithmetic means. This is important because the sampling frequency was much lower in November to mid-March than in the other sampling periods.
8. Page 10: Tables 5 and 6 show that the unidentified “Others” class of *E coli* isolates is always the largest class. Since the unknown isolates will mainly include both urban and rural animals in unknown proportions, the data cannot distinguish whether urban or rural BMPs should be emphasized for remediation. This conclusion is supported by the statement at the top of page 9 that statistical analyses show that there is no significant difference in fecal coliform concentrations at the two sampling sites. The Margin-of-Safety (MOS) used in the calculation of Load Capacity on page 14 does not address this point.

9. Page 11, third paragraph: "...USGS flow gauge located at the upstream site" should say "downstream site".
10. Pages 12 – 13: It is indicated that the TMDL is based on the previous water quality standards, not the recently revised standards effective December 31, 2005. The revised standards do not include an exemption for storm flow conditions; however, the previous water quality standards, as is shown on page 12, applies the fecal coliform criterion of 200 colonies/100ml only "when the stream or lake is not affected by storm water runoff". If the TMDL is to be based on this previous standard, then the samples taken at times when the stream was at storm flow conditions should not be considered in the analysis of sources of impairment of the stream. Further, the calculation of Loading Capacity described on page 14 should be calculated to achieve 200 colonies/100ml at base flow conditions, not at a "range of flow conditions" as is stated. Otherwise, pages 12-13 should be modified to reflect that the TMDL is based on the recently revised water quality standards, which do not include an exemption for storm flow conditions. Under the revised standards, the State could pursue a site-specific high-flow exemption to temporarily remove whole body contact recreational use when flow exceeds a specified flow.
11. Pages 23 – 24, last paragraph: The BST data show that horse and cattle appear to contribute equally to fecal coliform, although the number of horses is 1/10 that of cattle and the fecal coliform count per horse is one order of magnitude less than that of cattle. Among the possible explanations for this, the report neglects to include the possibility that the BST results might be inaccurate.
12. Page 24, second paragraph: The wet-weather data from the NPDES permit annual reports used to calculate an average concentration for urban storm runoff is not runoff data, rather it is in-stream data during wet-weather conditions and therefore does not accurately reflect fecal coliform concentration of actual runoff. The NPDES permit annual reports do contain runoff data that could be used instead, some of which is from the South Dry Sac and Pea Ridge watersheds.
13. Page 36, last paragraph: No justification is offered for preferring results from a data-poor modeling program over measured results. Also, the statement that the gaps in the measured data set lead to an underestimate of loadings is not explained. It seems that, partly because of uncertainties in bacterial die-off rates, loading might just as easily be overestimated.
14. Page 39: The description of existing efforts does not include the City's Water Quality Protection Policy. The Policy, implemented in 1999, applies to new developments in the two watersheds that drain to the Little Sac River – the South Dry Sac and Pea Ridge watersheds – as well as in all sinkhole watersheds. The Policy requires the use of Best Management Practices to minimize the effects of runoff on the quality of receiving waters.

15. Page 44, Table 23: The costs for storm runoff detention ponds and septic system replacement are significantly underestimated. The cost of land acquisition and long term maintenance, which are significant portions in the total cost of constructing detention basins, do not appear to be factored in.

We appreciate the opportunity to comment on this TMDL and look forward to meeting with the department to discuss our concerns. Please feel free to contact me at (417) 864-1901.

Sincerely,

A handwritten signature in black ink that reads "Todd Wagner". The signature is written in a cursive style with a long, sweeping underline.

Todd Wagner, PE
Principal Storm Water Engineer
Storm Water Services Division

C: Law Department
Public Works File



March 17, 2006

Mary Clark
Missouri Department of Natural Resources
Water Protection Program
Water Quality Monitoring and Assessment Section
P.O. Box 176
Jefferson City, MO 65102-0176

RE: Comments on Public Notice of the draft *Little Sac River Watershed Fecal Coliform Total Maximum Daily Load (TMDL)*

Dear Ms. Clark,

We appreciate representatives of the department and the Food and Agricultural Policy Research Institute (FAPRI) meeting with myself, Jon Jones of Wright Water Engineers, Inc., and Trent Stober of MEC Water Resources, Inc. on February 27, 2006. The purpose of the meeting was to discuss the City of Springfield's previously submitted comments on the draft Little Sac River TMDL. It was concluded at this meeting that the City would submit recommendations that we feel are the most important changes and additions to incorporate into the draft TMDL. Several of the items in the list include corresponding text in the attachment titled Suggested Text for the *Little Sac River Watershed Fecal Coliform Total Maximum Daily Load Phase 1*. These recommendations are not meant to supersede the City's previously submitted comments although there is duplication between the sets of comments.

We appreciate the tremendous amount of work that FAPRI, the department and contributing partners have put into this study and TMDL development. The City of Springfield has demonstrated its commitment to protecting and enhancing the region's water resources in many different ways. We continue this commitment here and share in the mutual goal of developing a plan to protect the Little Sac River based on sound science.

Suggested Changes/Additions

1. Department staff verified in our February 27 meeting that all TMDLs in Missouri are phased. Unlike other TMDLs, such as those for the James River and Shoal Creek, the draft Little Sac River TMDL contains no indication that it is phased. The TMDL should clearly indicate that it is a phased program by incorporating the following changes consistent with other TMDLs in Missouri:

DEPARTMENT OF PUBLIC WORKS

840 Boonville Avenue, P.O. Box 8368 Springfield, Missouri 65801-8368
phone: (417) 864-1900

homepage: www.springfield.missouri.org/gov e-mail: city@ci.springfield.mo.us

- a. The title of the document should be changed to *Little Sac River Watershed Fecal Coliform Total Maximum Daily Load Phase 1*.
 - b. The title of the Monitoring Plans section should be changed to “Monitoring Plans Under the Phased Approach” as shown in the attached Suggested Text.
 - c. The Implementation Plan in the attached suggested text is a phased approach and should replace the current Implementation Plan as explained in #5 below.
2. A section titled “Key Assumptions, Uncertainties, and Potential Sources of Error” should be added to the TMDL, potentially located before the section to be titled “Monitoring Plans Under the Phased Approach.” Uncertainty is a critical factor to consider prior to applying any water quality model for regulatory or policy purposes. A section devoted to this subject will make the document more defensible by clearly emphasizing points made in various locations in the study and discussing other points not currently or sufficiently included. By doing so, model uncertainties will be much more transparent and future monitoring plans may be designed to minimize uncertainty. The section should address the following:
- a. Need for Additional Data

The study mentions the need for additional data in several places; however this needs to be more clearly emphasized. In this new section it should be clearly stated that despite the significant amount of data collected to date, major data gaps still exist, in both stream and spring data. Only two stream stations were monitored and only for a period of one year. More spring data is particularly needed, not only water quality data, but also flow data and hydrogeologic interpretations including definition of recharge areas. The following two statements in the study emphasize the need for additional data and should be included in this section:

- Page 10: “The largest source seems to be what is currently unknown, 51% at the upstream site and 34% at the downstream site.”
- Page 19: “While there are some data about these springs, the information is not as thorough as would be needed to build an accurate model of the watershed hydrology.”

- b. Bacterial Source Tracking (BST)

Various bacterial TMDLs and other references reviewed by Wright Water Engineers, Inc. address uncertainties and sources of error associated with bacterial source tracking. For example, a document published by the U.S. Environmental Protection Agency (EPA) in June 2005 titled *Microbial Source Tracking Guide Document* includes an extensive discussion on the issues and uncertainties of this emerging science. Topics covered in this discussion include adequately representative sampling, persistence of specific strain/pattern/markers (SPMs) in

environmental waters, host specificity of the SPMs, transferability of the methodologies across laboratories, and adequate characterization of errors. The draft Little Sac TMDL currently contains little discussion of this kind. It is essential for this discussion to be included.

c. SWAT Model

The draft TMDL does not discuss the extent to which the SWAT model was reviewed by independent parties. Steps taken to assure reasonableness of the model should be presented.

On pages 15-16 are listed some assumptions made during the modeling process; however, a more comprehensive list of assumptions should be included in this section.

Uncertainties associated with modeling should be described, including those regarding the calibration and verification of the SWAT model in this study. For example, page 29 states, "It is difficult to determine the goodness of fit in the higher range of fecal coliform concentrations because of the small number of data points available." This indicates that model calibration cannot be evaluated during the periods that presumably produce the majority of the bacteria load. Model predictions were also not compared to individual sampling events. It should also be noted that the bacteria parameters of the model have been calibrated but not verified. The USGS data set appears to offer an excellent opportunity to verify the model.

3. The attached Suggested Text includes recommended changes to the current Executive Summary. The suggested text excludes the references to the scenarios in the Implementation Plan which we recommend be removed as explained in #5. The Executive Summary needs to state that this is a phased TMDL and that additional data is needed. Additionally, the current Executive Summary erroneously includes canoeing as an activity in the category of whole body contact recreation (WBC). Canoeing is classified as secondary contact recreation (SCR); based on the data in this study, SCR uses are currently attained.
4. The attached Suggested Text includes recommended changes to the current Monitoring Plan. The suggested text more clearly emphasizes and details the need for additional data.
5. Based on the following reasons, the current Implementation Plan in the draft TMDL should be replaced by the Implementation Plan in the attached Suggested Text. The department may want to consider adding to the suggested Implementation Plan a schedule and potential specific means available for achieving the additional monitoring and evaluation needed.

- a. Based on the BST data collected, to date, and with due recognition of the uncertainties and unknowns associated with the data, it is premature to focus on any particular source for reduction. All that can be reasonably said at this time is that reductions in all categories will be necessary to meet the applicable fecal coliform and *E. coli* criteria.
 - b. Due to the reasoning in (a) above, the Implementation Plan should not include scenarios that focus on a particular source. Furthermore, the scenarios in the draft inequitably focus on sources that do not correlate in significance with the BST and modeling results. For example, urban runoff appears to be assigned a disproportionate share of the estimated target load reduction since urban runoff predicted daily loadings were only 2% and 6% at FR129 and RD215 respectively. Scenario 3 on page 39 includes a 50% reduction of urban storm runoff contributions. However, no scenario is evaluated that includes reducing the contribution from storm runoff in rural areas even though sources in rural areas represent a larger portion of the surface loadings. As stated on page 34, “The main sources during storm flow conditions are the surface loadings: cattle and other unknown surface loadings (76 to 81%), goose (18%), and urban pollution 2% at RD215, 6% at FR129.” It is noted on page 32 that the unknown surface loadings referred to in the previous statement include the loading assigned to horses.
 - c. The discussion of existing efforts is incomplete. As we discussed in the February 27 meeting, a section on efforts by the City of Springfield is included in the suggested Implementation Plan.
6. The attached Suggested Text includes recommended changes to the current paragraph following Table 22 on page 43. The suggested text includes measure 10, education and outreach, not currently included in the discussion and accounts for the changes to detention pond costs recommended in #12 below. The suggested text also uses wording that appropriately takes into account the uncertainties that exist to date due to the need for additional water quality monitoring to further define sources of bacteria and their comparative significance. In addition, Table 22 should indicate that the affect of measure 2, sewer system inspection and repair, could reduce overflows to surface water as well as leaks to the groundwater.
 7. The attached Suggested Text includes recommended changes to the current Summary and Conclusions. The suggested text excludes the references to the scenarios in the Implementation Plan that we recommend be removed as explained in #5. Additionally, the suggested text corrects some errors in referencing the data of the study and represents the BST results as percentages of all isolates (consistent with the rest of the document) rather than percentages of only known results.
 8. The differences between the FAPRI bacterial data sets and other data sets, particularly the USGS and MDNR data sets, should be presented and discussed. It is

indicated on page 16 of the study that the USGS and MDNR water quality data sets are included in the monitoring analysis; however, these data are not presented or discussed. The TMDL should state that these data sets indicated compliance with the fecal coliform criterion. In fact, page 4 of the draft TMDL inaccurately represents these data with the following statement: "Various monitoring studies (Smith, 2002; MDNR, 2002) and the data collected during this study show that the concentrations have been and remain elevated beyond acceptable levels for recreational purposes." These data sets should be accurately presented and considered in the TMDL. Additional data collection is necessary to resolve the categorical differences between the FAPRI data set and the USGS and MDNR data sets.

9. The Description of Applicable Water Quality Standards and Numeric Water Quality Targets on pages 12-13 should be updated. A revision to the Missouri Water Quality Standards was adopted in November 2005 that includes both the existing fecal coliform criterion and the new *E. coli* criterion of 126 colonies/100ml for the WBC-A designated use. The fecal coliform criterion is to be phased out by the end of 2008 and replaced with the *E. coli* criterion, a better indicator of human health risk.
10. The paragraph on page 41 should indicate that sediment sampling would also need to include BST to determine the source if bacteria is found in the sediment. If BST results showed the source of the bacteria to be sewage, investigation should be conducted to determine the source of the sewage before concluding that it would be worthwhile to disinfect the effluent year-round.
11. The report indicates on pages 42-43 that a portion of the unknown bacteria sources and a portion of the bacteria identified as coming from sewage could be from septic tanks, suggesting that the study BST results may have underestimated the onsite wastewater contribution. However, this assertion is not indicated in the discussions of either the BST results or the model inputs. A statement to this effect should be clearly made in these sections of the TMDL, leading to the observation that further evaluation of this source category is necessary. Furthermore, the assumed failure rates for onsite wastewater systems given on page 5 should be independently confirmed. An MU Extension publication states that several surveys throughout the state have shown that 70% of systems are not functioning properly (Schultheis, 2001). A study by EPA lists a failure rate in Missouri of 30-50% (EPA600/R-00/008). Lastly, Table Rock Lake Water Quality, Inc., a non-profit organization focused on addressing onsite wastewater issues within the Table Rock Lake basin, also estimates much higher failure rates than given in the draft TMDL.
12. In Table 23, the costs for storm runoff detention ponds do not apparently consider the costs of land acquisition and long-term maintenance, which are significant when calculating the total cost. The following are more accurate cost estimates:

Excavation, grading, seeding, erosion control	\$3 - \$5/cu.yd. = \$15,000 - \$24,000/acre = \$20,000/acre average
Concrete work	\$227 - \$336/cu.yd. x 5 - 10 cu.yd./acre = \$2,000/acre average
Land acquisition	\$5,000 - \$100,000/acre = \$53,000/acre average
Average Total Construction Cost (low to average land acquisition cost)	\$27,000 - \$75,000/acre
Long-Term Maintenance	\$1,000/year/acre

The septic tank replacement cost of \$4,000 is an acceptable estimate for a conventional system; however, conventional systems are not appropriate for much of the study area. The typical cost for an advanced system appropriate for such sites ranges from approximately \$10,000 - \$14,000.

We appreciate the consideration of our comments and recommendations on this TMDL. Please feel free to contact me at (417) 864-1901.

Sincerely,



Todd Wagner, PE
Principal Storm Water Engineer
Storm Water Services Division

C: Law Department
Public Works File

Suggested Text for the *Little Sac River Watershed Fecal Coliform Total Maximum Daily Load ~~Phase 1~~*

Executive Summary

The weekly fecal coliform monitoring data at two sites on the Little Sac River indicate that the water quality criterion for whole body contact recreation (WBC) use (swimming) was not attained at both sites during the 2004 season. The geometric mean of fecal coliform concentrations was higher than the 200 colonies/100 ml criterion.

The bacterial source tracking data show that the highest fecal coliform loads come from unknown sources, geese, and humans. The data also show cattle, horses and septic tanks as contributors to the bacterial load in the stream. At base flow these loadings potentially come from the springs located in the upper part of the watershed or from direct inputs to the stream (illegal discharges, cattle in streams, wildlife). The load from the Northwest WWTP represents only 3% of the stream bacterial loading. More monitoring of the springs is needed to better characterize bacterial contamination of the springs and the sources of the contamination. In a karst environment, contamination of the springs can occur easily because of the fast pathways between the ground surface and shallow aquifer: sinkholes, cracks, and losing streams. During storm flow conditions, the loadings are transported from the landscape and urban areas to the streams by surface runoff.

Several efforts are ongoing to address the various sources of bacterial loading to the Little Sac River including best management practices (BMPs) to address agricultural sources and urban storm water runoff, and plans to reduce the geese population. Additional water quality monitoring is needed, particularly of springs, to further define sources of bacteria and their comparative significance and to resolve the categorical differences between the FAPRI data set and the USGS and MDNR data sets. Future monitoring efforts could also track changes in the bacteria loading as ongoing efforts continue. Based on needs identified by future data, a second phase of this TMDL could outline a plan for implementation of additional BMPs. Subsequent phases of the TMDL should be based upon attainment of the *E. coli* criterion, which is a superior indicator of human health risk as compared to the fecal coliform criterion being phased out by the end of 2008.

Monitoring Plans ~~Under the Phased Approach~~

Monitoring fecal coliform concentrations and the bacterial source tracking that were undertaken in this study have been terminated at the end of October 2004. Additional water quality monitoring is needed to further define sources of bacteria and their comparative significance and to resolve the categorical differences between the FAPRI data set and the USGS and MDNR data sets. Future monitoring efforts could also track changes in the bacteria loading as ongoing and planned efforts outlined in the Implementation Plan continue. Monitoring the flow of the Little Sac River at RD215 is

under the responsibility of USGS and likely will be ongoing. The following water quality monitoring will be ongoing:

- Monitoring by MDNR at several sites on the river.
- Monitoring of swimming holes by the Greene County Department of Health. One of these sites is located on the Little Sac River at Farm Road 125, very close to the FR129 site.
- Monitoring by USGS at the Walnut Grove site, west of the landfill, on Route BB.
- Weekly monitoring by the Watershed Committee of the Ozarks at 23 sites from 2004 to 2007.

Ongoing monitoring efforts should include testing for *E. coli* bacteria. A revision to the Missouri Water Quality Standards was adopted in November 2005 that includes both the existing fecal coliform criterion and the new *E. coli* criterion of 126 colonies/100ml for the WBC-A designated use. The fecal coliform criterion is to be phased out by the end of 2008 and replaced with the *E. coli* criterion, a better indicator of human health risk.

The following additional monitoring is needed but will be dependent on procurement of funding:

- The Adopt-A-Spring program coordinated by the Watershed Committee of the Ozarks provides some data about a few springs in the Little Sac River Watershed. Given that the springs may be contributing a significant portion of the bacterial loading to the river, a more systematic monitoring of the springs in the watershed should be considered. This monitoring would show whether the contamination at base flow is caused by the contamination of the springs or from direct inputs to the stream (illegal discharges, cattle in streams, wildlife). The sources of contamination of the springs could be determined using rep-PCR bacterial source tracking with the database that was developed in this study. Such determination would confirm or disprove that the sources are similar to the sources that have been identified in the river. Ranking of springs by flow contribution would help to prioritize monitoring efforts. Monitoring of springs should include not only water quality monitoring but also flow monitoring and better definition of recharge areas.
- Sediment sampling, including BST for source determination, should be considered to investigate the possibility of storage in river bed sediment of bacteria and its subsequent re-suspension during storm events.
- Further investigation of bacterial contributions from onsite wastewater systems could determine whether this source was underestimated in the BST results and may account for a portion of the significant unknown sources as well as a portion of the bacteria attributed to sewage. Other methods are available to assess for contributions from onsite wastewater systems besides BST such as fluorometric measures of optical brighteners.
- Flow monitoring is needed at other locations in addition to RD215 to gain an understanding of comparative flows at upstream and downstream locations.

Implementation Plan

As indicated in the title of this document, the Little Sac River TMDL will be completed in phases. This phase 1 implementation plan documents previous, ongoing, and planned activities to address non-point sources identified in this study. The major point source, the Northwest WWTP, is not a significant source of contamination during the recreation season according to the measured data and model results. The non-point sources identified by the bacterial source tracking in this study are cattle, horse, geese, sewage (other than the Northwest WWTP treated effluent), and septic tanks, with urban runoff additionally identified in the modeling results. Unknown sources comprise the largest percentage of the loading to the stream. As recommended in the monitoring plan, additional data is needed to further define sources of bacteria, particularly in springs, and their comparative significance. Future implementation phases of this TMDL will outline a plan for further best management practices (BMPs) as needed based on additional data gathered.

EPA 319 grant funds have been utilized in the Little Sac River Watershed to address excessive nutrients and bacteria reaching the creek. From 1992 to 1998, an EPA 319 grant provided education on agricultural management practices and on-site wastewater systems in the drainage areas of the Fellows and McDaniel Lakes. The grant supplied funding for the demonstration of management practices, water quality monitoring, and education/outreach activities. From 1995 to 2000, a different project, also funded with 319 funds, addressed the issues of storm water runoff and urban development impacts upon the water quality of Fulbright Spring. Another 319 project started in 2004 addresses the whole Little Sac River Watershed. It addresses the issues of nutrients and bacteria through water quality monitoring, education/outreach, and implementation of cost-shared practices including alternative watering systems for livestock, stream bank stabilization, managed grazing systems, fencing wooded areas, plugging abandoned wells, spring developments, seeding to native grasses, and sinkholes protection.

Several Agricultural Non-Point Source Special Area Land Treatment (AgNPS-SALT) projects are and have been conducted by the Greene and Polk County SWCDs in the Little Sac River Watershed. The Middle Little Sac River AgNPS-SALT project (2001-2007) aims to improve water quality in the middle section of the watershed and provides 75% cost-share for practices similar to what is proposed in the most recent 319 project, described above. The Upper Little Sac River AgNPS-SALT project (1997-2002) aimed to maintain the quality of the drinking water resources (Fellows and McDaniel Lakes, Fulbright Spring) while enhancing economic sustainability for agricultural producers through education and improved land management practices.

In 1995, the City of Springfield began its Infiltration and Inflow (I/I) Program with a primary objective to reduce the occurrence of sanitary sewer overflows. Since its inception, the City has committed over \$16 million to fund the program, resulting in rehabilitation of 64,559 linear feet of sanitary sewer lines and 12,583 manholes. Currently, approximately 11,000 linear feet of the Pea Ridge trunk sewer, located in the

Pea Ridge tributary watershed of the Little Sac River, is being reconstructed to reduce I/I and sanitary sewer overflows. Ten percent of sanitary sewer revenues are earmarked to finance ongoing I/I reduction efforts.

The City of Springfield has implemented a variety of efforts to address the quality of urban runoff. In 1999, Springfield City Council enacted the Water Quality Protection Policy that requires all new developments in sensitive watersheds, including the South Dry Sac and Pea Ridge tributaries of the Little Sac River, as well as sinkhole watersheds, to be designed with BMPs to minimize the effects of urban runoff on the quality of receiving waters. In 2005, the City extended the requirement for BMPs on all new developments citywide through the implementation of its revised Storm Water Drainage Design Criteria Manual. Since receiving its National Pollutant Discharge Elimination System (NPDES) Storm Water Permit in 2002, the City has implemented a variety of activities to address storm water quality including public education, illicit discharge detection and elimination, stream and runoff monitoring, inspection of industries, and others. In Fall 2006, the Springfield-Greene County Parks Department is proposing a countywide sales tax, a portion of which will fund waterways improvements aimed at reducing sediment, bacteria and nutrient loading. The proposed improvements include projects at Dickerson Park Zoo and Doling Park, both located in the Pea Ridge tributary watershed of the Little Sac River.

A reduction of the Missouri goose population back to the 1998 levels is a goal of the Missouri Department of Conservation. That would mean a 30% overall decrease from the 2004 estimated population. Canada goose control activities include habitat modification, exclusion, harassment, chemical repellents, and lethal control. A publication by the Missouri Conservation Commission gives details about giant Canada geese and the methods used to control their numbers (MDC, 2002).

Changed for MOC

Page 43, Paragraph Following Table 22

Measure 10, education and outreach, could help to reduce the bacteria loadings in the stream at both base flow and storm flow conditions by providing information to property owners in the watershed on agricultural and urban storm water runoff best management practices. Measure 1, a reduction in the geese population, could reduce the bacteria loadings in the stream, though it is uncertain at this point how bacteria from geese are reaching the stream (direct deposit or storm runoff). This is a goal of the Missouri Department of Conservation and will likely occur. Measures 4 and 5, storm runoff detention ponds and buffers, could help to reduce the bacteria loadings in urban and rural storm runoff. Costs for vegetative barriers and wooded riparian buffers are indicated in Table 23. These costs are based on estimates given by NRCS for Greene County (NRCS, 2005). Costs for detention ponds can vary, particularly based on the land acquisition cost, and also carry long-term maintenance costs. Estimates for typical overall cost per acre and maintenance costs are given in Table 23 (City of Springfield, 2006).

Summary and Conclusions

Results of this study indicate that 25% to 50% of the samples collected during the 2004 recreation season had concentrations of fecal coliform bacteria that exceeded the Missouri water quality criterion of 200 colonies/100 ml for whole body contact recreation (WBC) use (swimming), which is expressed as a geometric mean. The analyses showed important variations from sample to sample.

DNA analyses of these samples showed that the hosts of these bacteria colonies included the following sources present in the watershed: cattle, sewage, geese, horses, and a small percentage from septic systems. At Farm Road 129, 15% of the bacteria were attributed to geese, 16% to sewage, 9% to cattle, 7% to horses, and 2% to septic. At Farm Road 215, 27% of the bacteria were attributed to geese, 13% to sewage, 14% to cattle, 10% to horses, and 2% to septic. However, 51% of the fecal coliform at Farm Road 129 and 34% at RD215 could not be identified with our database. Only 3% of the bacteria identified as coming from sewage can be attributed to the Northwest WWTP treated effluent based on measured data, implying that there are other sources of sewage.

A model was built using SWAT that includes mathematical representation of the many processes that control the movement of water on and in the soil, plant growth, and the fate and movement of nitrogen, phosphorus, and bacteria. Inputs were collected using soil and land use maps, weather records, and information given by the watershed steering committee. The model was calibrated using long term flow data and water quality data measured in 2004.

A TMDL for each site was determined based on the simulated flows and the fecal coliform criterion of 200 colonies/100 ml for WBC use. Model results show that the average daily load at FR129 needs to be reduced by 65% to 90% by flow condition in order to meet the criterion throughout all flow conditions. At base flow the loadings potentially come from contamination of the springs located in the upper part of the watershed or from direct inputs to the stream (illegal discharges, cattle in streams, wildlife). While there are some data about these springs, the information is not as thorough as would be needed to build an accurate model of the watershed hydrology. The Northwest WWTP contributes only 2 to 4% of the average daily base load at FR129. At storm flow conditions, the main sources are the surface loadings. The percent reduction needed at RD215 differs between the estimates based on measured data and the model estimates.

Based on the bacterial source tracking data collected, to date, and with due recognition of the uncertainties and unknowns associated with the data, it is premature to focus on any particular source for reduction. Additional water quality monitoring is needed, particularly of the springs, to further define sources of bacteria and their comparative significance and to resolve the categorical differences between the FAPRI data set and the USGS and MDNR data sets. Future monitoring efforts could also track changes in the bacteria loading as ongoing efforts continue.

Mary

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

Matt Blunt, Governor • Doyle Childers, Director

www.dnr.mo.gov

June 29, 2006

Mr. Todd Wagner
City of Springfield
Department of Public Works
840 Boonville Avenue, PO Box 8368
Springfield, MO 65801-8368

Dear Mr. Wagner:

Thank you for your comment letters dated January 20, 2006, January 26, 2006 and March 17, 2006 about the Little Sac River Total Maximum Daily Load (TMDL) study completed by the Food and Agricultural Policy Research Institute (FAPRI) for the Missouri Department of Natural Resources (the department). The department appreciates your commitment and consistent efforts to protect the water quality in the Springfield area. FAPRI's responses to the technical questions related to the draft TMDL are listed below in responses #2-12. The department's responses to the non-technical issues are included in response #1.

1. The department need not understand all of the variables for correcting a problem before initiating steps, such as a TMDL. Targeting a specific reduction in pollution is a way of establishing a goal for achieving measurable progress. If this TMDL does not accomplish all that is necessary to eliminate the impairment, the department will revise it as necessary to ensure achievement of the goal. EPA recognizes and accepts this adaptive approach to solving certain water quality problems. Once we receive more information, we may reopen the TMDL to incorporate those elements that better ensure success.

The FAPRI TMDL study is designed to address the originally suspected source of bacteria in the river, the Springfield Wastewater Treatment Plant (WWTP). The study sampled below the WWTP to confirm whether or not the WWTP discharge is the major source of the contamination. Data from the study show that the WWTP is not a major source during the recreational season. The 2002 303(d) list included non-point sources as the origin of the bacterial load. The 303(d) list has been corrected to show that the Little Sac River will not be deleted from the next 303(d) list.

Managing the non-point sources requires a multi-faceted approach. The revised TMDL identifies the urban and rural best management practices (BMPs) already undertaken in the Springfield area. The city's continuing efforts to reduce runoff include water quality protection regulations, BMPs for development, future sewer collection system improvements, and waterway funding that the city is currently planning. Much of the grant related work to date is for rural practices. Some of these activities are managed through local organizations such as the Watershed Committee of the Ozarks. Activities such as education, demonstration projects, cost-share practices, on-site system education and sinkhole protection are on going in the area. Hopefully, the agricultural community's continued implementation and evaluation of BMPs will reduce the bacterial load to the river.

2. We agree to add a section called "Uncertainties and Potential Sources of Error". This section has been placed after the section entitled "Margin of Safety (MOS)". It highlights the need for additional data on spring flow and water quality, on urban runoff quality, and on stream flow and water quality during storm events. However, additional water quality monitoring, beyond the U.S. Geological Survey (USGS) and the department's monitoring, depends on the funding available. This new section also includes a discussion of the uncertainty issues related to bacterial source tracking and to the modeling of bacteria fate and transport.

We do not see the need to expand on the assumptions made during the development of the SWAT model. These are extensively described in the section entitled "Model Set-up and Description", pages 14-25. This section is made of several sub-sections and includes the assumptions and generalizations on soil characteristics, land management, and other input parameters that were necessary to build the model. The U.S. Environmental Protection Agency has reviewed the model and they had no comment on it.

Regarding bacteria concentration during runoff events, we agree that such monitoring is needed. Technical difficulties exist because of the need to use a refrigerated automatic sampler for this type of sampling and the need to get the samples to a laboratory within 6 hours of collection. Given these extra technical difficulties, such monitoring is more costly than monitoring through collection of grab samples. Models are, even if imperfect, one way to estimate concentrations during these events.

3. Executive Summary - We deleted any reference to boating since that use is not included in the uses concerned with the fecal coliform threshold of 200 colonies/100 ml. We included the fact that cattle and horses are contributors to the bacterial load. Septic tanks are included in the "human" category" and the base flow loadings may come from these sources.

Any reference to a specific scenario was deleted but we left a reference to the assessment of different alternative management scenarios. We also included the fact that efforts are already on going in the area.

4. "Monitoring Plan" Section - Most suggestions have been incorporated into the text.
5. Many of the suggestions for the "Implementation Plan" have been included in the text. The scenarios were left but presented as examples to illustrate how improvements could potentially be achieved. A table was added that shows how often the geometric means and single sample concentrations exceed the water quality criterion. The City of Springfield has added emphasis in regard to the on-going efforts in the watershed.
6. Some text has been modified and added to reflect your suggestions regarding the comments on what was previously Table 22 on page 43 (now table 26).
7. Suggested changes to the "Summary and Conclusions" have been largely taken into account to re-write that section.
8. We decided not to include a discussion of the new data set released recently. Our writing is based on the data set that was published at the time we did the study which did indicate violation of the water quality criterion. While it is true that the most recent USGS dataset does not indicate violation, the combination of that dataset and the FAPRI data set does indicate violation.
9. We updated the description of the water quality standard that includes the newest revision.
10. We included some wording related to the possibility of determining the source of bacteria in sediment before deciding to move forward with year-round disinfection.
11. We did not see anything on pages 42-43 that suggests that the results may have underestimated the onsite wastewater contribution. We may have said something verbally about this during our meeting in February. We have explained in the section entitled "Uncertainties and Potential Sources of Error" that the BST results will be stronger if the pattern library includes more patterns than it currently does. This is valid for all classes. Emphasis is given on the need to collect landscape samples that represent the diversity within each source in the watershed.

Regarding the assumed failure of septic tanks, it is difficult to compare studies that do not clearly define "failing" and "not functioning properly". The estimates given in the report cited in the Little Sac TMDL were independently estimated. We agree with your statement that a better assessment of the failure rate of septic systems in Missouri and more specifically in Southwest Missouri would be helpful. A statement has been added to that effect on page 5.

12. Table 23 (now table 27) has been updated and includes the land acquisition and maintenance costs of detention ponds as well as the cost of advanced septic systems.

Mr. Todd Wagner
Page Four

Thank you again for your comments. Please contact Dr. Claire Baffaut (573) 882-1251 or Ms. Mary Clark of my staff at (573) 526-1002 or by mail at Missouri Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, Missouri 65102 if you have any additional questions.

Sincerely,

WATER PROTECTION PROGRAM

A handwritten signature in black ink, appearing to read "Philip A. Schroeder". The signature is fluid and cursive, with the first name being the most prominent.

Philip A. Schroeder, Chief
Water Quality Monitoring and Assessment Section

PAS:mcl

c: Dr. Claire Baffaut, FAPRI



MISSOURI DEPARTMENT OF CONSERVATION

Headquarters

2901 West Truman Boulevard, P.O. Box 180, Jefferson City, Missouri 65102-0180
Telephone: 573/751-4115 ▲ Missouri Relay Center: 1-800-735-2966 (TDD)

JOHN D. HOSKINS, Director

REPLY TO: Resource Science Center
1110 S. College Ave.
Columbia, MO 65201
Telephone: 573-882-9880
Fax: 573-882-4517

January 23, 2006

Ms. Mary Clark
Department of Natural Resources
WPP, Water Quality Monitoring and Assessment Section
P.O. Box 176
Jefferson City, MO 65102-0176

Dear Ms. Clark,

The Missouri Department of Conservation (Department) appreciates the opportunity to provide comments on the Total Maximum Daily Loads (TMDL) for the Little Sac River Watershed in Greene and Polk Counties. The Department fully supports the attainment of the water quality standards necessary to meet the goals of the Clean Water Act in the State of Missouri as they are essential to protecting the fish, forest and wildlife resources of the state.

The DNA source-tracking included a set of patterns for migratory geese (p. 5). The TMDL characterizes the percentages of isolates identified as migratory geese in Table 5 and Table 6 (p. 10) of the TMDL. The TMDL explains the goose life cycle and states that "In winter, only a limited number of geese remain in the watershed. In spring, they arrive in greater numbers and prepare to nest" (page 11). Actually, the opposite is the case in Missouri. The migratory geese begin migrating North in February and have left Missouri by mid-March. They begin the migration back to Missouri in October with the majority of the birds arriving in November and December.

There are four different populations of Canada geese that migrate to Missouri and nest elsewhere, they are: the Eastern Prairie Population, the Mississippi Valley Population, the Tallgrass Prairie Population and the Giant Canada Population. In addition to the migratory Giant Canada goose population, Missouri has a population of resident Giant Canada geese that remain in Missouri year-round.

Attachment 1, Table 1 shows the mid-winter goose survey estimates for Greene and Polk counties. These estimates represent the total numbers of migratory and resident geese present during the first week of January in these two counties from 1997 to 2005. The number of geese present in any given year fluctuates a great deal. The Department is working towards reducing the resident goose population in the state by

COMMISSION

STEPHEN C. BRADFORD
Cape Girardeau

CHIP McGEEHAN
Marshfield

CYNTHIA METCALFE
St. Louis

LOWELL MOHLER
Jefferson City

Ms. Mary Clark
Page 2
January 23, 2006

addressing specific goose problem areas where large numbers of geese tend to congregate. Therefore we are uncomfortable with the 30% goose reduction value in the TMDL, because we are addressing specific goose problem areas and not a statewide reduction. Table 2 shows the goose nest data available in the Little Sac River watershed.

There is not a lot of goose habitat in the Little Sac River watershed. However, there might be some spots where geese tend to congregate. Habitat modification in those areas would encourage geese to move out of this sensitive watershed. Canada geese graze on grass and crops. Providing vegetative buffers between the geese and the water source using native prairie grasses or other vegetative barriers would discourage the geese from using the adjacent waters and also absorb nutrients.

Domestic waterfowl can attract Canada geese to an area. Could some of the contamination be related to domestic waterfowl?

Thank you for the opportunity to comment. Please contact Cindy DiStefano at (573) 882-9909 ext. 3297 or Cindy.DiStefano@mdc.mo.gov if you have any questions.

Sincerely,


Cindy DiStefano
Resource Scientist – Aquatic Health


David Graber
Resource Scientist – Waterfowl

Attachment

Attachment 1

Table 1
Mid-winter Goose Survey Estimates for Greene and Polk Counties

Year	Number of Geese	
	Greene	Polk
1997	740	225
1998	200	250
1999	500	500
2000	450	732
2001	450	475
2002	500	2000
2003	150	80
2004	412	70
2005	0	250

Mid-winter survey estimates for Greene and Polk counties. These are estimates for the entire county for the years indicated, as reported by MDC Conservation Agents. These estimates represent the total numbers of migratory and resident geese present during the first week of January.

Table 2
Goose Nest Data in Little Sac River Watershed

Year	Plot	Birds
1995	1	0
2001	1	1 pair
2001	2	2 singles

Random plots sampled in the Little Sac River watershed. Goose nest data is gathered by counting the nesting birds in 2 square mile random sample plots. These plots are used to estimate the number of nesting pairs of resident Giant Canada geese.

FAPRI
At the University of Missouri
**Food and Agricultural
Policy Research Institute**

101 Park DeVille Drive, Suite E
Columbia, MO 65203
Phone: (573) 882-3576
FAX: (573) 884-4688
www.fapri.missouri.edu

Ms DiStefano
Resource Scientist – Aquatic Health
Resource Science Center
1110 S. College Ave.
Columbia, MO 65201

February 23, 2006

Dear Ms DiStefano,

Ms Clark, from the Missouri Department of Natural Resources (MDNR), has communicated with me regarding the comments you sent her about the Little Sac Total Maximum Daily Load (TMDL). I will first point out that the options presented in the implementation section are scenarios run to assess how the water quality criteria could be attained. These scenarios do not have a mandatory aspect attached to them. As a matter of fact, the US Environmental Protection Agency (EPA) does not require an implementation section in the development of a TMDL anymore. MDNR does require this section as a way to initiate implementation efforts.

The DNA bacterial source tracking included a set of patterns from geese feces collected in the Little Sac watershed, more specifically in different parks in North Springfield. In addition, our technician only collected feces after it was observed being deposited on the ground by a goose. No feces were collected without seeing the animal defecating. If domestic waterfowl can attract Canada geese, the corresponding contamination would be included in the "other unknown" category.

The ponds and lakes in these parks are indeed attracting geese populations, migratory and resident. These are, as you suggest, spots where geese tend to congregate. I have listed control activities suggested by the Missouri Department of Conservation (MDC) to address these critical spots (habitat modification, exclusions ...) and referred to the MDC publication on the topic. My intent is to make local organizations aware of the problem caused by the geese population in the watershed and the impact it has on the bacterial loading of the stream as demonstrated by the bacterial source tracking.

The term "migratory" in our report is probably misleading and I will propose to remove it as the collected feces represent all species present without any attempt to focus on migratory geese.

The interpretation proposed for the increase of bacterial loading attributed to geese during spring and summer and subsequent decrease during fall with the lowest values obtained during the winter was proposed by Brad Jump, MDC biologist in Springfield, during a public meeting in Springfield. We can revise the report to eliminate that interpretation, leaving only the facts that the numbers go up and down as the weather warms up and cools down. It is also during that meeting that I learned about the 30% reduction goal; I have taken that value as a starting point. However, I understand that it may not be a good idea to mix a statewide goal with reduction needs in a specific location. I suggest we eliminate all reference to an MDC statewide goal and insert a sentence in the report to the effect that a 30% reduction is taken as a starting point.

Thank you for your comments. Please contact Dr. Claire Baffaut (573-882-1251) or Ms Clark (573-526-1002) if you have any questions.

Sincerely,

Claire Baffaut
FAPRI
Program Director - Watersheds

LITTLE SAC RIVER WATERSHED

Missouri Department of Natural Resources
Water Protection Program
Water Quality Monitoring and Assessment Section
P.O. Box 176
Jefferson City, MO 65102

RECEIVED FEB 2 2005

WATER PROTECTION SECTION

Ladies and Gentlemen:

As outdoor men and women, we equestrians are concerned about our natural resources and recognize the need for appropriate conservation measures. We welcome this opportunity to express our concerns and comments on the following items in the Little Sac River Watershed, Fecal Coliform Total Maximum Daily Load, FAPRI-UMC Report #07-05.

► **We suggest that additional investigation and/or explanation is needed on the reported horse coliform count.** Table 12 (page 23) notes that a horse has approximately four fifths of the fecal coliform production rate as some other animal species. *"One can note that the number of horses in the watershed is one tenth that of other animal species. Combined with the fact the fecal coliform count per horse is one order of magnitude less than that of some other animal species. It is surprising to see as much horse fecal coliform in the bacterial source tracking results", (page 23-24) versus other animal species.*

We are most concerned that superficial examination of this data, as it stands, could lead to false conclusions and misuse of this study by other agencies and/ or individuals.

► **What is your confidence interval in the efficacy of ribotyping laboratory techniques?** We note the large quantity of unknowns on isolate identification, i.e. 51% at the upstream site and 34%, downstream site. We understand that ribotyping of coliform strains is a relatively new technique.

In the 1998 study conducted by the U.S. Geological Survey on the Upper Jack's Fork River, it was stated that "...ribotyping results should be treated as experimental for the purpose of this study because of the large degree of uncertainty in the method." (Assessment of Possible Sources of Microbiological Contamination and Water-Quality Characteristics of the Jacks Fork, Ozark National Scenic Riverways—Phase II (page 30)

A more recent document, Microbial Source Tracking Guide Document, June 2005, U.S. Environmental Protection Agency, Office of Research and Development, urges similar caution in the use of microbial source tracking (MST) in the establishment of TMDLs.

► **Is E. coli a reliable and valid marker for differentiation of the total bacterial load by species?** We recognize the widespread use of E.coli as an indicator of bacterial contamination. The enteropathogenic strains are human only. The term “fecal coliform” is used when a more precise term would have been E.coli. The study did not identify any of the other gastrointestinal flora species. The numerically dominant bacteria in animal intestinal tracts are most likely anaerobic, gram positive and include some 400 different species. Is there data on the quantity of E.coli excretion by species? Such might account for the identification of horses as responsible for the high microbial load.

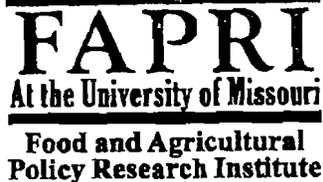
► **We are troubled by references to equestrian trailriders as an explanation for the increased horse microbial count.** *“Possible explanations include a larger presence of horses grazing close to a stream, deposits that occur during horse rides, and/or a slower rate of fecal coliform.....”* (page 24). *“These animals (horses) graze year-round but horse-riding activities pick up in late spring and summer.”* (page 5) There are no public horse trails or horse facilities related to such in that defined watershed area. Any riding activity would most likely be on the property of the individual or the road. There would not be an influx of horses into the area. Many equestrians do not ride in the heat of the summer months, another erroneous assumption.

We recognize that problems do exist with our streams and rivers in Missouri. We at Show-Me Missouri Back Country Horsemen stand ready to work with you in any way we can. However, we needed to voice our concerns with the Little Sac River report #07-05.



Robert L. Burns

Board Chair, Show-Me Missouri Back Country Horsemen



101 Park DeVille Drive, Suite E
Columbia, MO 65203
Phone: (573) 882-3576
FAX: (573) 884-4688
www.fapri.missouri.edu

Mr. Robert Burns
Board Chair, Show-Me Missouri Back Country Horsemen
751 S. Sparks
Springfield, MO 65802

February 23, 2006

Dear Mr. Burns,

Ms Clark, from the Missouri Department of Natural Resources (MDNR), has communicated with me regarding the comments you sent her about the Little Sac Total Maximum Daily Load (TMDL).

The DNA bacterial source tracking database included a set of patterns from horse feces collected in Southwest Missouri. In addition, our technician only collected feces after it was observed being deposited on the ground by a horse. No feces were collected without seeing the animal defecating. The "other unknown" category represents all the species that were not included in the database: domestic waterfowl, deer, rodents, other wild birds ...

A Jackknife analysis of our database indicated that equine patterns were correctly identified as "equine" 90% of the time. In addition, the sample to sample variation indicates that the confidence intervals of our estimates were 2% and 6% during dry and wet weather at the upstream site, and 4% and 7% during dry and wet weather at the downstream site.

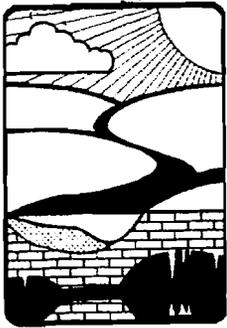
The laboratory who performed this analysis also took part in a nationwide assessment of bacterial source tracking methods in 2000, using the same method (rep-PCR) as used in this study. They performed very well and the rep-PCR method was found to be one of the most reliable methods. This being said, it is true that the results have to be interpreted with caution. However, the general conclusions of the Little Sac bacterial source tracking analysis still stand: horses do contribute to the problem in amounts that are comparable to cattle. We propose to remove the phrases that refer to horse-riding activities picking up in late spring and summer and the references to ride-associated deposits in the streams. We will emphasize the fact that additional investigations are needed to establish why horse fecal *E. coli* are found in the stream in amounts that are surprising given the smaller number of horses than cattle in the watershed.

Regarding the use of *E. coli* or fecal coliform, we have not found any data on the quantity of *E. coli* by species. Since *E. coli* is a type of fecal coliform, we used the fecal coliform numbers to characterize the waste of each animal species. At the time this work was done, the bacteria water quality standard in Missouri was based on fecal coliform. It is currently phased out at the preference of using *E. coli*. The bacterial source tracking analyses, however, are based on fecal *E. coli*.

Thank you for your comments. Please contact Dr. Claire Baffaut (573-882-1251) or Ms Clark (573-526-1002) if you have any additional questions.

Sincerely,

Dr. Claire Baffaut
FAPRI
Program Director - Watersheds



**Watershed
Committee**
of the Ozarks, Inc.

320 North Main Avenue
Springfield, Missouri
65806
417-866-1127
(Fax) 417-866-1918

COMMITTEE

Stuart Wetzel

Chair

Dan Chiles

Vice Chair

Sharon Faulkner

Treasurer

Chris Coulter

Secretary

Gail Emrie

Ted Hillmer

STAFF

Loring Bullard
Executive Director

Dave White
Operations Manager

Matt Keener
Watershed Coordinator

Mike Kromrey
Project Assistant

Karen Olsen
Office Manager

March 10, 2006

Phil Schroeder, Chief
Water Quality Monitoring and Assessment Section
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102

Mr. Schroeder,

The staff of the Watershed Committee of the Ozarks has reviewed and discussed the draft TMDL for the Little Sac River. Thank you for extending the comment period to allow us to have additional time for review. As you know, our organization is a not-for-profit established over twenty years ago to protect the sources of public drinking water for Springfield and Greene County. We are very interested in water quality in the Little Sac, since this basin typically provides (through Fulbright Spring, Well No. 1, McDaniel Lake, Fellows Lake and Stockton Lake) over 70% of the community's drinking water in a given year. Over the last twenty years, we have implemented several projects in this watershed intended to improve water quality. These projects have focused primarily upon nutrients and sediment, given the experiences of City Utilities related to eutrophication of the community's water supply reservoirs and the resulting taste and odor episodes.

While we understand that bacteria have triggered the Little Sac's inclusion on the 303(d) list and the subsequent drafting of a TMDL, we feel that sediment and nutrients remain as significant concerns. With water supply reservoirs, nutrient enrichment, eutrophication and sedimentation commonly create serious problems from a drinking water treatment standpoint. For this reason, we would like to suggest that human and monetary resources directed toward implementation of the proposed TMDL should coincide with and support ongoing efforts to reduce nutrients and sediment in source waters, to the degree possible.

We also have technical concerns with the draft TMDL. We understand that due to the costs involved, the extent of bacterial source tracking work was limited in FAPRI's study. However, the use of only two sampling points in a watershed of 400 square miles is very sketchy in terms of the actual applicability of inferences derived. To that extent, we agree with the suggestion by the city of Springfield's Stormwater Division that a phased TMDL would make sense in this watershed, allowing for additional monitoring to try to better define the extent and nature of the bacterial "problem."

SPONSORS

City Utilities of Springfield • City of Springfield • Greene County

Since we have worked with springs to a considerable degree, we also have concerns about a target of 85% reduction in bacterial loading from springs. Again, this number (and its model platform) is based on a very limited number of monitoring points. Many springs, particularly in the northern portion of the Little Sac basin, have never been sampled. Further, working with springs is very different than dealing with surface streams, whose watersheds are fairly easily defined. Any efforts directed toward reducing bacterial loads in springs would need to be based on at least rudimentary delineations of the springs' recharge areas, so that potential sources could be assessed. For most of our springs, particularly those outside of Greene County, this information is lacking. Again, this argues for a phased TMDL, during which efforts could be directed toward defining the recharge areas of at least some of the larger springs in the basin that provide a significant portion of base flow to the Little Sac River.

Because springs apparently contribute a high proportion of the base flow to streams in this basin; and because the greatest human exposure to stream water is presented during base flow conditions, when more people are using and immersed in the river, we agree that springs are logical points to work toward bacterial reductions. However, in order to target reduction efforts, it would be very helpful to have sufficient dye-tracing and spring monitoring information, including, potentially, specific source tracking at springs over a variety of flow conditions. For this reason, we are considering applying for an EPA "watershed restoration" grant, which might provide funding for this type of monitoring, although, obviously, our prospects for approval at this point are unknown. If DNR has plans to provide some of this type of monitoring in the Little Sac basin, we would like to know this very soon.

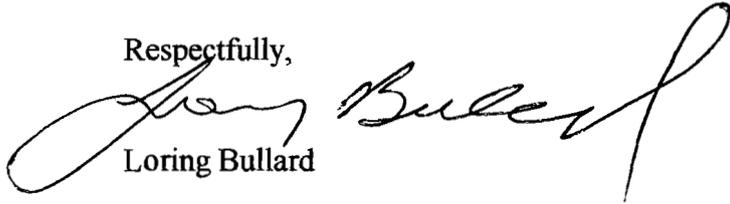
As for stormwater contributions to bacterial loading, we understand the Springfield Stormwater Division's concerns related to the city's NPDES stormwater permit, and how changing or adding to the enforceable provisions of that permit could impact their operations and community costs, particularly when the study results seem to suggest a minimal bacterial impact from stormwater. From our own sampling, as well as from national databases like NURP, we know that urban stormwater frequently contains high levels of bacteria. However, high numbers of bacteria in urban runoff occur during storm events, when human activity in rivers is lower. We suggest that as part of a phased TMDL, there could be a further characterization of local urban runoff related to bacterial loading. For example, it might prove very useful to characterize at least a few storm events with respect to the proportion of bacteria related to sanitary sewer overflows or septic tanks versus pet wastes. Due to the costs of this work, we would like to suggest that the state provide resources for these kinds of source tracking efforts, if implemented.

In summary, we suggest that additional thought be put into the allocations of loadings from various sources, as well as focusing on the sectors where reductions in bacteria can be most efficiently and reliably achieved. Further, we would like to see implementation efforts directed toward getting the "biggest bang for the buck," i.e., toward practices that will reduce nutrient and sediment loadings along with bacteria. We would like to offer our services, to the extent that we can, toward achieving a better understanding of how bacteria and other pollutants move into and through surface streams in this karst watershed, and the associated health risks. We are particularly concerned about the potential to focus so much attention on

bacteria alone that the quality of our long-term water source, Stockton Lake, continues to decline in spite of significant expenditures of community resources.

If you have any questions about these comments, please feel free to contact our office.

Respectfully,

A handwritten signature in black ink, appearing to read "Loring Bullard". The signature is fluid and cursive, with a large loop at the end of the last name.

Loring Bullard

STATE OF MISSOURI Matt Blunt, Governor • Doyle Childers, Director
DEPARTMENT OF NATURAL RESOURCES

www.dnr.mo.gov

May 25, 2006

Mr. Loring Bullard
Water Committee of the Ozarks, Inc.
320 North Main Avenue
Springfield, MO 65806

RE: Little Sac River Total Maximum Daily Load

Dear Mr. Bullard:

Thank you for commenting on the Little Sac River Total Maximum Daily Load (TMDL). The Department of Natural Resources (the department) also appreciates the significant work your committee has accomplished on the river's watershed.

We recognize that the Little Sac River is under other threats of pollution besides bacteria. Sediment and nutrients appear to be significant emerging or continuing problems for the stream. The department will make an effort to bring appropriate attention to controlling these other pollution sources. We encourage your committee to seek the resources necessary to further its own efforts so that we may continue to assist each other in addressing other forms of pollution before it reaches the point of impairing the beneficial uses of the stream.

At this time, the Little Sac River is on the 303(d) list of impaired waters for elevated levels of bacteria. We are prepared to address that pollutant as proposed by the TMDL. The actions to address this specific pollutant will not impede any future actions needed to address other pollutants once more information becomes available about them and their effects.

FAPRI's study was designed to address the originally suspected source of bacteria in the river, the Springfield Wastewater Treatment Plant (WWTP). The study chose to sample below the WWTP to confirm whether or not the WWTP's wastewater was the major source of the contamination. Data from the study show that the WWTP is not a major source during the recreational season because the wastewater is disinfected before being discharged. The 2002 303(d) list identified non-point sources as the origin of the bacterial load.

Managing the non-point sources will require a multi-faceted approach. As explained in the TMDL, several activities will be instrumental in bringing about real improvements in water quality. Some of these activities are managed through the committee, including education, demonstration projects, cost-share practices, on-site system education and sinkhole protection. Further improvements can be gained through continued implementation of best management practices by the agricultural community.

Mr. Loring Bullard
Page Two

The department need not understand all of the variables for correcting a problem before initiating steps, such as a TMDL. Targeting a specific reduction in pollution is a way of establishing a goal for achieving measurable progress. If this TMDL does not accomplish all that is necessary to eliminate the impairment, it will be revised as necessary to ensure achievement of that goal. EPA recognizes and accepts this adaptive approach to solving certain water quality problems. Once we receive more information as you suggest, we may reopen the TMDL to incorporate those elements that better ensure success.

Samples from the river during low flow conditions indicate that springs are a major contributor of the flow and therefore the main conduit for pollutants. However, as you stated, information is limited on the source of the contaminants. Identifying all sources of recharge to the springs and the potential contaminants could take many years. In the meantime, grant funded projects and city regulations are helping to establish better management of the stormwater recharge through sinkholes and losing streams. These activities are reducing the contributions of contaminants to groundwater despite the lack of good recharge information. The TMDL should encourage these types of activities. Should additional information on the actual sources of groundwater contamination become available, the TMDL may be modified to include any newly identified corrective measures.

Source tracking for leaking septic tanks, sewer overflows and pet wastes is a good idea for a grant project. We would support a watershed restoration grant from EPA to identify points of bacterial contamination through source tracking and dye tracing. The department's Division of Geology and Land Survey (DGLS) currently has no plans to do any dye tracing in the Little Sac River watershed. You can contact DGLS at (573) 368-2101 if you wish to discuss their participation in a future project. The department's Water Protection Program does not have funding to do bacterial source tracking at this time.

The department has not proposed any changes to Springfield's stormwater permit. The city has implemented a number of efforts to improve the quality of stormwater runoff, including:

- regulations on all new development to reduce stormwater runoff.
- activities including public education of stormwater runoff issues, detection and elimination of illicit discharges, stream and runoff monitoring and inspection of industries.
- a proactive stance of proposing a countywide sales tax that will, in part, fund improvements to reduce sediment, bacteria and nutrient loading to the stream.
- a construction schedule to repair and replace leaking sewer lines and overflows.
- a requirement that all wastewater discharges to a losing stream must be disinfected.
- a willingness to work with the Missouri Department of Conservation to reduce the goose population in the watershed.

All of these efforts should bring about a significant reduction in bacterial contamination of the Little Sac River over time. Sampling to confirm the effectiveness of these measures would be desirable, however the expenditure of time and effort on the above ongoing initiatives would seem a better investment.

Mr. Loring Bullard
Page Three

The department appreciates the forward-thinking suggestions in your comments and supports future work in better defining the various sources of other pollutants found in the Little Sac River. We realize that the focus of this TMDL does not address all of these needs, but rather addresses only the narrow issue of bacteria contamination highlighted by the 303(d) list. Previous grants to organizations like yours have greatly advanced the progress of addressing many of the threats to the Little Sac River. Hopefully, through continued sharing of information and coordination on goals, we can expand that effort to benefit other waters such as Stockton Lake.

We appreciate your efforts to inform and educate the public regarding best management practices, spring assessments and water quality monitoring. Please continue your excellent work in the Ozark area. Should you have any questions regarding this letter, please contact Ms. Mary Clark, Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, Missouri 65102 or by phone at (573) 526-1002.

Sincerely,

WATER PROTECTION PROGRAM

A handwritten signature in cursive script that reads "Mary Clark for".

Philip A. Schroeder, Chief
Water Quality Monitoring and Assessment Section

PAS:mcl

*PN ended
March 30 -
no response
referred*

AVA SADDLE CLUB
P.O. Box 1559
Ava, Missouri 65608

*after PN
period*

APR 19 11:52
FBI - MOBILE

April 17, 2006

Missouri Department of Natural Resources
Water Protection Program
Water Quality Monitoring and Assessment Section
P.O. Box 176
Jefferson City, MO 65102

Ladies and Gentlemen:

The Ava Saddle Club would like to extend our concern over the Little Sac River Watershed, Fecal Coliform Total Maximum Daily Load, FAPRI-UMC Report #07-05 regarding the contribution by horses to that load.

As stated in the attached letter to you from the Show-Me Missouri Back Country Horsemen organization, the members of the Ava Saddle Club also recognize the need for appropriate conservation measures. As President of the Saddle Club, I am writing to express the desire of the club members to support the opportunity to express our concerns and comments on the above item.

I believe our members are using the lands in appropriate ways and are using every effort to conserve and enhance our wilderness, wildlife, and water resources. Since many members are trail riders and our club holds regular monthly trail rides, we experience and appreciate the outdoors and take measures to conserve and preserve it.

Please re-examine the Back Country Horsemen statement and add our support to its suggestions and questions.

Sincerely,



Bob Voyles
President, Ava Saddle Club
(417) 767-4681