

Developing Synoptic Human Threat Indicators for Assessing the Ecological Integrity of Freshwater Ecosystems

4th Regional Oversight Committee Meeting

St. Joseph, MO

August 30, 2007

Meeting Minutes

Gust Annis (MoRAP) called the meeting to order at 10:00 AM and covered the meeting logistics. Everyone introduced themselves. The meeting was dominated by representatives from Missouri and EPA Region 7. Tom Wilton from Iowa DNR was the only state representative from outside of Missouri. There were no state representatives from Kansas or Nebraska.

Participant List:

Gust Annis, Missouri Resource Assessment Partnership (MoRAP)
Scott Sowa, Resource Assessment Partnership (MoRAP)
Matt Engel, Missouri Department of Conservation (MDC)
Tory Mason, Missouri Department of Conservation (MDC)
Jo Ellen Hinck, United States Geological Survey (USGS)
Randy Sarver, Missouri Department of Natural Resources (MoDNR)
Matt Combes, Missouri Department of Conservation (MDC)
Benita Hamilton, Environmental Protection Agency (EPA)
Eliodora Chamberlain, Environmental Protection Agency (EPA)
Holly Mehl, Environmental Protection Agency (EPA)
Walt Foster, Environmental Protection Agency (EPA)
Tom Wilton, Iowa Department of Natural Resources (IaDNR)

General Presentation:

Gust gave a presentation on the project background and progress with particular emphasis on progress since the last meeting (January 2007). This presentation will be posted on the project web page. As part of his presentation Gust provided a brief review of the last oversight committee meeting. Some key discussion components from the last meeting included:

- Lots of discussion on ranking/weighting
- Some felt that weighting should be used minimally because of biases and regional variation
- Many people believed the raw data is going to be more useful than the resulting HTI
- May be best to develop separate indices for local and overall watershed
- Develop separate Human Threat Index (HTI) for each element of biological integrity

Gust indicated that we will try to assign some sort of confidence or data reliability for each input dataset that we quantify.

Gust's presentation then moved into a project update. This portion of the presentation alternated between project progress updates and group discussion.

Gust indicated that the Missouri DNR 319 grant monies have come through for the Missouri portion of the project.

Literature Review:

The Literature review is done by major topic (nine topic areas), but these topics need to be synthesized. The literature review was completed by Kathy Doisy from the University of Missouri. Walt Foster (EPA) asked if it is going to be put up on the web. Scott Sowa (MoRAP) and Gust said it would once a syntheses and review was completed.

Agricultural Chemicals:

Work was done to find a method to account for Agricultural Chemical applications. The USGS has grids of agricultural pesticide use in the conterminous U.S. based on data compiled in 1997. These grids were published in 2007. These data consist of 43 pesticides each represented as an individual grid. Pesticide applications were based on county sales and tied to specific landcover classes. The grid pixel size is 1 km. We took this same basic approach, but tied the county sales to the NLCD with a 30 meter pixel size and combined all pesticides that are applied to pasture/hay and all pesticides that apply to row crop agriculture to produce two grids. In other words, we produced a grid of total pasture/hay pesticides and a grid of total row crop pesticides.

Discussion commenced on the limitations of this process. Walt Foster pointed out the fact that county sales are not 100% correlated with application rates in a given county. Gust and Scott indicated that they are aware of this fact. Scott felt that these data are fairly accurate for larger streams, but may or may not be for any given headwater stream.

Eliodora Chamberlin (EPA) thought that these data may not be appropriate for local assessment. Both Walt Foster and Jo Ellen Hinck (USGS) pointed out the fact that many chemicals are crop specific and the percent composition of crops is also presented by county. Jo Ellen Hinck wondered if we were losing anything by grouping across so many chemicals since some chemicals are applied more or are more persistent and toxic. Scott and Gust agreed, but pointed out that we don't know what chemicals those are and doing a separate run for each chemical is an overwhelming amount of work. This could be done, but not for this project.

Accounting for Distance:

Gust discussed what we have been doing to account for distance to threat considerations. Many methods have been explored, but most had limitations or problems especially pertaining to the large files sizes that we have to work with. Gust explained the VBA programming that Mike Morey wrote to solve some of our problems with distance issues. This process gives us minimum, maximum, and average distance to all "threats" of a given class upstream in the drainage area. Walt Foster and Randy Sarver (MoDNR) wondered if it wouldn't be better to incorporate the amount of discharged material into the calculations instead of just minimum and mean distances. Scott and Gust thought this would be helpful but for NPDES data only the permitted, not actual, discharge is reported. Walt stated that for TRI and RCRIS the actual

annual discharges are reported so this could be done for those calculations. Gust said they would look into doing this more appropriate calculation.

Fragmentation:

Discussion turned to the issue of fragmentation of stream networks by impoundments. Gust indicated that we want to know how fragmented stream networks are due to dams/impoundments. Michael Morey wrote another VBA program that runs in Microsoft Access that calculates two basic pieces of information; distance from downstream reservoir and connectivity or the length of interconnected stream (i.e. how far can a fish swim without having to go through a reservoir). Tom Wilton (IaDNR) asked how a barrier was defined for these calculations (e.g., a 25 ft high dam, low head dams, etc.?). Scott said that the smallest/shortest barriers would be those mapped in the NWI and those impoundments were not mapped using any dam height/design criteria. Tom stated that such criteria would be important since it would allow us to better assess under what conditions is the barrier actually serving as a barrier and which species would be affected under various flow conditions.

Population Change:

Gust presented information on what they were working on regarding population change. He pointed out that they wanted to know what watersheds were gaining population, losing population, or not changing. Gust indicated that MoRAP is using the 1990 and 2000 census block data. This census data is being partitioned across the catchment polygons assuming an equal distribution across the census block. Gust then showed some preliminary results.

Headwater Impoundments:

Gust then pointed out that they are presently working on the problem of identifying headwater impoundments. The NWI appears to be the best source for this data, but it is not available for most of Kansas. As a result they will probably splice in water bodies from the NLCD for these areas. This is probably the best that can be done until the NWI is completed. Matt Combes (MDC) asked how current the NWI data is. Scott and Walt said that the dates vary considerably. Matt pointed out that just this summer three new waterbodies were constructed near his house and three more are undergoing construction.

Gust posed the question: How do we separate natural wetlands/waterbodies from headwater impoundments? Walt Foster, Holly Mehl (EPA), Matt Combes, and Tom Wilton discussed that there are very few pothole wetlands that remain, but we also have to consider natural depressional wetlands like those in the Sand Hills and playa lakes like in western Kansas. Walt Foster has a coverage of playa lakes for Kansas and Nebraska and stated that he will get this coverage to Gust. However, nobody at the meeting was exactly sure how or if we would be able to accurately separate these out.

Error Checking:

Gust presented information of how they will be conducting error checking. This will consist of selecting 100 random stream segments and manually examining the attribute values. In addition, an automated process will be used.

Presentation and Discussion on Data Issues:

Gust had a series of slides on some of the data issues they have been encountering.

The presentation and discussion turned to locational accuracy. Some of the point datasets lack the precision necessary for accurate assessments (i.e. Address matching was used to create points; some points are matched to owner address not end of pipe/facility). Examples include LUST, NPDES, and CAFOs. Jo Ellen Hinck brought up the issue of qualifying the source datasets. Gust agreed and pointed out the fact that not all points are bad, but we need to somehow qualify this by stating what percentage of sites are incorrect and/or maybe these data only apply to larger streams. Walt Foster wanted everyone to remember we are really developing a methodology which is valuable in and of itself and these data are getting better all the time and thus the Human Threat Index (HTI) or raw data will improve in the future.

Another problem is having different sources of the same datasets and knowing which one to use. Gust pointed out some issues with two partially overlapping datasets: RCRIS and TRI. In some instances the location for the same facility is different in each of the datasets

Some data like the mines are represented as points in one file and polygons in another without exact correspondence.

Data issues review: Three basic data issues - location, completeness, and multiple datasets representing the same thing.

Discussion on CAFOs:

Concerning CAFOs there are two major datasets: NPDES CAFOs and EPA CAFOs; each with its own problems. The NPDES CAFOS is not consistent across region, has facilities missing, and is somewhat generalized in that multiple facilities are sometimes represented as one point. Randy Sarver pointed out that these are very different datasets since most CAFOs don't have a discharge. The EPA CAFOs data "appears" consistent across the region, but it often misses some of the larger facilities and it has poor locational accuracy.

Scott asked about the state datasets. Gust indicated that we have state datasets for Missouri and Iowa. Scott brought up the point that what defines a CAFO differs among states. Tom Wilton stated that all CAFOs are AFOs in Iowa but not vice versa. Tom thought that we could get a better AFO coverage for Iowa which is updated all the time and said he would get Gust the contact person for this data.

Gust asked for suggestions on CAFOs. Scott suggested we just create an all variable database then subset these data on stream size and spatial grain based on what we believe are the best data suited to each grain of assessment. Jo Ellen suggested we also qualify the datasets on their age and update schedule. Gust agreed. Randy asked if we could check each of the datasets or those that we are having more problems with and then calculate an error rate for the dataset. Gust indicated that he could do that with certain datasets, but would also have to identify those instances (commission errors) where there's a facility but no point in addition to those instances where there is a point and no facility (omission errors).

Tom asked whether the AFO datasets have number of animal units that could be used as a weighting factor. Scott, Gust, and Walt were not sure, but this would allow us to calculate the number of animals in the watershed vs. the number of facilities. Randy indicated that Missouri measures things in terms of human equivalents. Tom said Iowa measures things in terms of animal units. Since these units are not comparable it is unlikely that we will be able to generate such calculations in a standardized manner across the entire region.

Walt asked if we had an Ethanol Plant coverage. Gust indicated that he did not. Walt will provide one.

Randy wanted to know if we had any data on NRCS conservation practices. Scott explained that these data are for the most part not available in a digital format.

Discussion on NPDES:

Gust inquired as to whether we should we utilize the remaining NPDES data after we pull out those threats that are already being accounted for in other datasets (i.e. CAFOs, RCRIS, TRI).

Walt thought we need to account for these differently than RCRIS and TRI since it does not give actual discharge only permitted. Randy said that Missouri does separate out major from minor, but was not sure about other states. Tom suggested getting rid of construction site permits since many of them are likely not active any more. Walt and Matt agreed since they are already correlated with other things we are already measuring. Tom thought that storm water permits are important and need to be kept in the calculations if these can be identified in the NPDES database.

Discussion on In-stream Mining:

The discussion turned to In-stream mining. Gust presented some of the problems they have been encountering. The basic idea is to quantify only in-stream sand or gravel mines. The problem is that there is not a good data set for these type of mines. Missouri has a data set of in-stream gravel mines, but it is not complete. Other data sets covering EPA Region 7 have other problems. For instance, a dataset from the Bureau of mines contains mines that are not necessarily in the stream channel.

Eliodora wondered if we knew how many points fall in streams vs. lakes. Gust indicated that they do not. Tom said that in his experience in Iowa most sand and gravel mines are situated in the floodplain and not in the active channel. Randy thought that this may be something that should be set aside for field/site visit assessment since the type of sand and gravel mining is so variable and the effects of these different approaches is so different. Gust gave another example of an Iowa dataset that represents mining properties, but that do not necessarily have active mines on them.

Randy said that sand and gravel mines should have an NPDES permit if they are washing the mined materials. Randy was not sure if mining and dredging are considered the same thing in these datasets. Randy felt that we need to take a hard look at these datasets and make a determination whether it is worth the time and money to include them.

Eliodora suggested we look into filtering the datasets to get at active mines that are dredging and washing the materials. Gust thought that could probably be done.

Discussion on Channelization:

The discussion turned to Channelization. Gust discussed the various methods that MoRAP has utilized to try to identify channelized streams. Every method has worked to some degree, but often introduces a nearly equal amount of error. Things that have been tried include: Sinuosity/straightness programs, Angle calculation, and the NWI. The primary problems with the NWI are: 1) incomplete coverage (Kansas), 2) misses some channelized stream segments, 3) it is at a different resolution which makes it hard to relate to the 1:100,000 scale networks being used for the overall project. Gust gave examples comparing the various methods and datasets.

Eliodora mentioned that the Corps of Engineers has a dataset of 404 permits (dredge and fill). This dataset documents location using Lat/Long. Walt did not think this would be a suitable dataset for the project needs. Scott indicated that many streams were channelized before the Clean Water Act/404 permitting began in the 1970's.

Randy suggested that sinuosity may be the best bet, using a low threshold.

Walt indicated that he has used the NWI to get at channelization. In Kansas they used a sinuosity index using a threshold based on channelized segments in Iowa. It captured too much but wasn't bad.

Randy and Walt both thought the literature suggests a value of 1.1 as an appropriate threshold. Walt cautioned that we also need to consider the length of segment over which sinuosity is calculated. Walt will get the value they used for Kansas to Gust.

Tom suggested using the NWI. Tom also pointed out that they are redoing the NWI in Iowa. Tom will get Gust the name of the person in charge of this effort.

Discussion on Biological Data:

The discussion turned to Biological Data. Scott and Gust both had questions about the REMAP data. Gust showed the databases they had obtained from the Central Plains Center for BioAssessment (CPCB).

Scott pointed out the fact that they need lots of data, but were only able to locate the 1994/1995 EPA REMAP data in a summarized form. Matt said that he could crank out the necessary summary statistics if MoRAP provided him with the data they have.

Matt will tell Gust what exactly he needs and then Gust will contact CPCB to see if we can get these data. If this doesn't work then Matt will contact the state leads to get their data directly. Tom indicated that the CPCB has been doing a project looking at relations between water chemistry and invertebrates across the region and they have gone through the process of filtering water chemistry data. Tom suggested contacting Don Huggins or Debbie Baker to get these water quality data.

Future Directions:

Gust wrapped up the meeting by presenting the next tasks they will be working on. These include:

- Work on today's decision items
- Headwater impoundment analysis
- Buffer analysis
- Error checking
- Development of the Human Threat Index
- Developing models empirically using biological data
- Model validation in Missouri. Will need to get locations of sample sites to Matt by June 1, 2008.

Gust and Scott thanked everybody for their participation. The meeting adjourned at 2:50 PM.