

For the last four months, I've participated in a workgroup to develop rules for gravel mining in Missouri, set up by the MO Dept. of Natural Resources. The workgroup came about because authority to regulate gravel mining had passed to the MO DNR a few years ago. Up until the early 1990's, DNR's Land Reclamation Program was the permitting and enforcement authority that supposedly oversaw removal of sand and gravel from streams. Enforcement was rather lax, and probably the majority of gravel mining sites were unpermitted. In the mid 1990's, regulation was taken over by the Army Corps of Engineers. Regulation was still rather lax, but that wasn't good enough for the industry, and the American Mining Congress sued for a ruling that the Corps had no authority in this matter...and won.

So authority passed back to the MO DNR, under Missouri statutes regulating strip mining, as well as the MO Clean Water Act. DNR basically used the old Corps guidelines for several years, but wished to develop a set of rules, and held public meetings to propose such action earlier in 2002. The meetings were dominated by gravel mining interests, which pushed for few and lenient rules. DNR then decided to set up the workgroup, composed of both mining and conservation interests, in order to try to come up with rules everybody could live with.

Most gravel mining is done on the streams of the Ozarks because that is where the gravel is located. DNR had issued permits, requiring the permittees to use the old Corps rules as guidelines, for about 200 different gravel mining sites. That represents only about 25% of the gravel mining sites in southern Missouri. In addition, DNR's authority does not cover private individuals taking gravel using their own equipment, and any political subdivision (this includes county road departments, who do a lot of gravel removal). The old Corps guidelines were a compromise between gravel operators and conservationists that many do not believe went far enough to protect the stream resource, and even though many permitted operations followed them to some extent, the number of unpermitted sites and other entities taking gravel from the streams resulted in considerable environmental degradation.

Gravel mining adversely affects stream resources in many different ways. The most obvious is that it changes the aesthetic character of the stream. In other words, it's ugly. This, in turn, can in itself affect the attractiveness of the stream for visitors and thus have an adverse economic impact. Improper mining practices can multiply the the negative impact by making the stream muddy, reducing fisheries resources, and causing bank erosion. A study done by Arkansas State University showed that gravel mining on five Ozark and Ouachita Mountain streams resulted in tourism losses to the affected areas totaling over \$4 million annually.

More importantly, gravel mining effects the physical character of the stream, its habitat, and its wildlife communities. Gravel is often consolidated enough to "armor" the stream bed, stabilizing banks and bars. Removing the armoring layer of gravel exposes loose materials that are then transported downstream. These materials range from gravel to fine silt that fills in pools. As the current removes this material during high water events, it sometimes scours out holes that the river will try to fill back in by removing sediment

from upstream, so upstream areas are affected as well. The most significant instances of this happen when holes are dug or scoured in the stream channel that are considerably deeper than the bed upstream. In these cases, “head-cutting” results. In head-cutting, the stream attempts to smooth the unnaturally sharp drop in gradient going into the deep hole by digging deeper into its banks upstream. Upstream beds are lowered and destabilized, resulting in channel changes and bank erosion. Specific instances of this in Missouri have caused bank erosion that removed bank vegetation, exposing the banks to a continuing cycle of erosion. They have also caused stream beds to be lowered as much as 10 feet upstream from the mining site, in some cases exposing buried pipelines, exposing bridge footings, and causing bridge damage and failures.

Digging away from the active channel of the river can also cause significant impacts. The excavation can “capture” the channel during high water events if it is deeper than the adjacent channel or if the high water scours it deeper. The river abandons its old channel and moves into the excavation. Even if the stream does not continue to flow through the excavation after the high water, fish and other stream creatures are often stranded in the deeper excavation and subjected to higher temperatures, lower oxygen levels, and greater predation compared to fish in the active river channel. The stream may also “annex” the excavation by washing away the intervening bank, resulting in large, wide pools that may be very shallow. This causes an overall warming of the stream as more water surface area is exposed to sun, with detrimental effects to cool water aquatic creatures.

Bar skimming, which is the removal of gravel on existing bars to the level of the water line, also causes significant impacts. Bar skimming during low flows can result in a wide, flat sheet of water at slightly higher flows which can remove fine sediments exposed by the bar skimming and transport them downstream. This sediment not only muddies the stream but also affects spawning and feeding of game fish. By removing the gravel “armor”, it may also cause greatly increased removal and transport of larger gravel off the skimmed bar during high water.

Gravel mining necessitates the use of heavy equipment on and near the stream bed, which causes disturbance to stream-side vegetation. Access roads can also be a point where erosion of the banks starts, as the protecting vegetation no longer exists in the road bed.

Stockpiles of excavated material in or near the stream channel can cause serious alterations of the channel during high water, and finer materials can be washed downstream from such stockpiles.

Often, gravel extraction necessitates removing large rocks and woody debris from the channel and channel edges. This debris plays a major role in shaping the channel through stream hydraulics. Log jams at the head of gravel bars, for instance, anchor the bar and trap gravel, and also deflect the current to scour the channel and keep it deeper. Large logs in Ozark streams are some of the most important habitat features for game fish in these streams.

The riparian zone, which includes the stream banks, bank and stream-side vegetation, and vegetation landward of the high banks, can be damaged by gravel mining. The damage can result in bank erosion, mud and other sediment washing into the river from the eroded banks and from farming operations landward of the high banks, and reduced shading with increased stream temperatures associated with the loss of bank vegetation. The riparian zone can be damaged in many ways by gravel operations, not all of them immediately obvious. Channel deepening from head-cutting can lower the floodplain water table and destroy vegetation dependent upon it. Shifts in the stream channel due to gravel digging can cause more frequent flooding of vegetation, and the shifts or other degradation of the stream channel can cause undercutting of vegetated banks and bank collapse due to increasing the height of banks. Removing gravel too near vegetation can cause the vegetation to be washed away with the next high water. More obvious effects include the actual removal of vegetation to get at the gravel, and the destruction of vegetation from the operation of heavy equipment, and from processing plants and gravel stockpiles on or near the stream banks.

At their worst, these impacts to the stream itself can cause the actual loss of land as banks are eroded, and thus loss of real estate values and farm revenue. The Arkansas State University study showed an annual loss of nearly \$800,000 in farm revenue and over \$800,000 in real estate from gravel mining on the five Arkansas streams that were examined.

The effects to fish and wildlife are very significant. The changes in turbidity and the deposition of silt below gravel mining sites affect fish by reducing their feeding efficiency, reducing their tolerances to diseases, and increasing stress. The increased deposits of sediment also disrupt spawning by smothering eggs and fry. Increased temperatures resulting from wider stream channels and removal of shade can affect cool water species and make the stream more attractive to warm water species like carp. Habitat degradation from channel scouring, head-cutting, and bank erosion upstream of the mining site directly affects the fish, as does channel alteration and removal of wood cover within the mining site.

All these changes also adversely affect aquatic plants and algae and smaller invertebrate animals, which make up the bottom of the food chain. Thus they reduce the overall productivity of the stream. The Arkansas State study showed a loss of over \$1.7 million annually in damaged fisheries on the five streams studied.

The economic benefits of gravel mining must be weighed against these environmental costs. In the year 2000, Missouri led the nation in production of construction gravel. Though there is more quarry rock produced in Missouri than gravel, the gravel is very desirable for use in concrete. Any reduction in gravel mining would have economic impacts both in loss of income and in increased construction costs, but these impacts are not well-known.

Even less well-known and more disputed are other supposed benefits of gravel mining. Ozark streams undeniably carry large bedloads of gravel. Partly this is because of the

geology of their watersheds, and partly because of poor land use practices that have caused excessive erosion of the gravel into the streams. Many smaller streams have poor habitat due to wide gravel beds, lack of deeper pools, and decreased surface flow. Many believe that these problems are due to excessive gravel in the streams, and removing the gravel will improve the streams. Common sense says that this may be true on some streams, those that have large amounts of loose gravel being transported down their channels. However, this has not been shown to be the case in the studies. Once a stream's watershed has suffered to the point that there is a lot of excess gravel in the stream channel, it takes many years for the problem to solve itself, and it seems that it is impossible to remove enough gravel to have beneficial results outside the area being excavated. Instead, excavation only continues and adds to the instability of the gravel load, insuring that it keeps moving and filling in the stream channel.

Many landowners want gravel removed from their streams, not only for the income (25 cents a ton or more), but because they believe that moving the gravel can protect their land. A common belief is that large, high gravel bars push the water flow against the opposite bank and cause bank erosion. Removing the bars changes the water flow and takes pressure off the opposite bank. However, an examination of stream hydraulics makes this belief questionable. Gravel bars tend to accumulate on inside bends. If the outside of the bend is cut into a high alluvial bank at the edge of a bottom field, the river will naturally strike that bank with more force, gravel or no gravel. Often, the tree cover was originally removed from the high bank, causing the river to start cutting into it and making the natural bend sharper. As the channel bent more into the bank, it also widened the bed and began to deposit gravel on the inside. As long as the high bank is not protected from further erosion, the river will continue to cut into it. The gravel appears to be the problem, but in reality it is a result of the problem, and removing it will not alter the fact that the bend in the channel is there, and the river will continue to cut into the outside bank in high water as long as it is unprotected. Piling gravel up at the edge of the high bank and moving the channel toward the inside of the bend is a poor solution, because the river will still want to cut into the outside of the bend, and the unconsolidated gravel is easily moved out of the way by the current in high water.

Landowners also often believe that removing gravel and obstructions in the stream bed will allow the water to move past their land more efficiently in high water, and thus cause less flooding of their land. In the very short term this may be true, but if the water is moving more efficiently, it is also moving with more force, and will probably cause more bank erosion and channel scouring and lowering through their land. It also adversely affects their neighbors both upstream and downstream. Upstream, the lowering channel will also cause bank erosion, and downstream, the volume of water flowing at greater speed off the upstream landowner's property will cause greater flooding and more erosion.

However, the belief that gravel removal is beneficial to Ozark streams is still widespread. Although studies have shown the many adverse effects of gravel mining, notably in Arkansas, Vermont, Wisconsin, Washington, Georgia, and North Carolina, Ozark property owners and county officials are still skeptical. In participating in the gravel

mining workgroup, I encountered not only the economic interests of the miners themselves and the landowners, developers, and county officials, but the pervasive skepticism of the scientific data and the belief that gravel removal is necessary for the well-being of the streams.

The Arkansas study is the one most applicable to Missouri Ozark streams, because it was done on three Ozark streams in Arkansas, Illinois River, Kings River, and Crooked Creek. These streams are very similar to most Missouri Ozark streams. It revealed a consistent pattern of negative impacts. Physical structure of the streams was altered in ways that made it less like the ancestral habitats of Ozark stream creatures. The streams had a more monotonous shape and depth, with less woody cover, less large rocks, less shade, and less riparian vegetation. Bankful widths were increased, which had effects on downstream patterns of spacing between riffles and pools. Most gravel streams have riffles at an average of every 5-7 stream bed widths. In other words, if the average stream bed width is 100 feet, the riffles will average 500-700 feet apart. Widening the channel forces the stream to try to lengthen the distance between riffles. This results in fewer riffles and longer, shallower pools. The widened stream channel means the stream flow is weaker during high water, and less able to form distinct riffles and pools, as well as less able to keep sediment moving through pools. The result on the streams studied was that pools below gravel operations were longer and shallower, and there were more long, shallow flats.

There was less woody cover both in disturbed areas and downstream. There was more turbidity and more depositing of sediment downstream.

There was a significant reduction in game fish populations in mined sites and downstream, along with an increase in large non-game fish such as carp.

In addition, the study noted that mining sites were unattractive, and that access roads encouraged casual use with no control, which resulted in further damage by vehicles including ATVs, along with littering and illegal dumping.

This study recommended that gravel removal should be limited to brief periods of only one or two times a year, because frequency of disturbance was at least as important as its severity. Removal of boulders and cobbles had major impact on habitat and wildlife, and they should be replaced between mining periods. Vehicular traffic should be strictly limited. Gravel should not be removed deeper than a half meter (1.5-2 feet) above the normal water level of the stream. Trees and other vegetation should be carefully preserved. Not only should care be taken to never allow a plume of muddy water to travel downstream from mining sites, but also the armoring should be replaced over expanses of excavation so that the sediment left there would not travel downstream in high water. Stockpiles of gravel should never be left in the stream bed. Only one road access to a site is necessary, and it should be gated and constructed to minimize erosion during floods. Gravel washing operations should be located above normal flood level, and fines and sediments from washing should never be allowed to re-enter the stream.

Natural vegetation should be restored after mining, by planting it in strips from water's edge to the high banks.

A pattern became apparent in the make-up of the workgroup. There were representatives from 6 different gravel mining companies. They were supported by 4-5 people that were county commissioners from central Ozark counties or county planning commissioners, along with a representative of the Farm Bureau, a representative of the Ozark Property Rights Conference, and 2-3 people who listed themselves as private landowners. Usually opposing this group was myself as a representative of the MO Smallmouth Bass Alliance, a Sierra Club representative, a person from the MO Chapter of the American Fisheries Society, one from the MO Coalition for the Environment, one from Trout Unlimited, a couple who were Stream Team Volunteers, a couple who said they were private landowners, and a representative from Associated Electric Cooperative. There were a number of people that were from the Department of Conservation, DNR, Fish and Wildlife Service, and the Geological Survey, but early on the miners and their allies made sure that the government people did not get to vote on any of the rules; they were there strictly for "guidance". All the government people were very much for strong stream protection, and would have been on our side. As it ended up, we were consistently outnumbered, and were forced to push for alternatives on rules, rather than simply voting for a particular rule—we would have lost out every time. In addition, the miners and their allies were able to have two state legislators who were friendly to their interests sitting in on later meetings, as well as lobbyists for their interests. While participating in discussions concerning the proposed rules, they continually questioned both the need for any rules at all, and the legal authority of DNR to make and enforce rules.

Our starting point was the old Corps guidelines. The group came up with various ideas for modification of those guidelines, and each member selected their preferred option. The three options on each rule getting the most votes from the members of the workgroup were to be submitted to the Land Reclamation Commission for consideration for the final set of rules. The Land Reclamation Commission will receive our recommendations at an open public meeting on January 30.

Following is a discussion of the rules we considered.

1. The first rule concerns the types of gravel deposits that could be excavated. The old Corps guidelines said that excavation would be limited to deposits in unconsolidated areas containing primarily smaller gravel (at least 85% is less than 3 inches in diameter) that is loosely packed and contains no woody perennial vegetation greater than 1.5 inches in diameter, measured at breast height (4.5 feet).

The only disagreement on this rule was the vegetation. The intent of the rule was to protect gravel bars that were stable enough to have had vegetation growing on them for several years. The Sierra Club noted that the proposed rule should reflect a reasonably early stage of stabilization, and that vegetation that has survived 2-3 flooding seasons would present reasonable evidence of stabilization, but the 1.5 inch at breast height

would still allow miners to dig up gravel bars that had 6-8 year old sycamores and even older willows. They recommended that the vegetation measurement be 1 inch at 6 inches above the ground.

2. The Corps rule said that an undisturbed buffer of 20 feet should be left between excavation and the waterline, and between the excavation and bank vegetation greater than 1.5 inches at breast height.

The purpose of this rule is to protect the stream channel in the event of high water, keep turbidity from excavation activity out of the stream, and protect bank vegetation from disturbance. Sierra Club's recommendation for vegetation size also applied to this rule. But the gravel miners objected to this because they said that many of the bars they would be digging were not large enough to leave a 20 foot buffer and still be able to dig. One of them noted that he always left a substantial buffer zone at the upstream end of the bar, because it protected the stream channel and also allowed more gravel to pile up on the bar in high water, so he could continually dig on the same bar. But none of the other gravel miners wanted anything like that either. Their idea, which all of them and their supporters voted for, was to just say that "a buffer zone of adequate width to prevent turbidity and insure the biological, physical, and chemical integrity of the water during times of excavation shall be left...and a buffer zone of adequate width to protect bank integrity should be left between the excavation area and the base of the high bank."

It was pointed out that their wording left it to them to decide how wide the buffer should be. This was the pattern on a lot of their suggestions; to let them decide what was adequate. Their lobbyist, who was at the last two meetings, even said that they should do what they thought was best, and if it resulted in damage to the resource then DNR could take punitive and corrective action. The DNR said that the whole idea was to PREVENT damage, not punish people after the damage happened.

I pointed out that the gravel miners' proposal also did not address either vegetation along the high bank, or vegetated areas on the gravel bar itself. They could dig right up to any vegetated areas of the bar, which would result in no protection for that vegetation. They didn't want to consider that.

Another option that was suggested, and got enough votes to be submitted, was that for bars greater than 100 feet wide, the buffer zones would be 20 feet, and for bars less than 100 feet wide, the buffers would be 10 feet.

I and most of the pro-conservation people opted for the original Corps version, with the vegetation measurement changed to 1 inch at 6 inches above ground.

There was another part to this Corps rule concerning buffer zones, which said that a buffer of 25 feet shall be maintained landward of the high bank, and disturbed areas within this buffer shall be limited to maintained access roads only. The gravel mining interests agreed to this rule with no change. Sierra Club suggested the buffer should be 100 feet, which is the minimum that is considered by the Department of Agriculture to

protect the stream from pollution from farming operation run-off, and to protect the banks from erosion during floods. I and several others voted for the Sierra Club version.

3. The Corps guidelines said that gravel shall not be excavated below water elevation at the time of removal, and if the stream is dry, excavation shall not occur deeper than the lowest undisturbed elevation of the stream bottom adjacent to the site.

The purpose of this rule is to maintain the existing stream channel. Allowing digging deeper than water level will often result in the stream shifting into the excavated area during high water and leaving its old channel. Sierra Club suggested that digging be stopped at one foot above water level as a further protection against this happening.

The gravel miners, on the other hand, came up with entirely different wording, which said that gravel shall not be excavated below water elevation, except: "For wet stream reaches, excavation depth restrictions may be modified if it is determined...that a variance would not significantly impact the stream resource based on the presence of bedrock to prevent head cutting, excessive bedload, gravel rich areas, or any other appropriate reason."

Headcutting, which was abundantly pointed out by the professionals at DNR and the Geologic Survey, results when deep holes are dug in the stream bed. The stream bed then erodes upstream to smooth out the drop in elevation at the site of the excavation, and often will lower its bed upstream by 10 feet or more, often exposing bridge pilings, pipelines, etc. as well as eroding banks. It was pointed out that even a bedrock bottom upstream from the excavation doesn't always stop this from happening, as floods will move a surprising amount of supposedly solid bedrock. And it was pointed out that this wording does not protect the stream channel from shifting to the excavation.

The gravel mining interests all voted for their option. The rest of us voted either for the original version or the Sierra Club version.

4. The Corps said that water conveyance areas within the channel shall not be relocated, straightened, cut off, shortened, widened or otherwise modified. Water conveyance areas were defined as the area where water is flowing, or in the case of a dry stream, where water would flow after a rain event as indicated by a defined stream channel.

We changed the wording to just say stream channels, instead of water conveyance areas. Most voted for this change, but a few voted for the original version.

5. Corps rules said that within 30 days of the removal of excavation equipment from the site, disturbed streambank areas shall be revegetated or otherwise protected from erosion. For long term operations or those that will be periodically revisited as gravel is deposited, access points shall be appropriately constructed and maintained to prevent erosion.

The gravel miners wanted the wording changed so that the access roads were designed and constructed to MINIMIZE erosion—in other words, they wanted to cover themselves if their roads did in fact erode.

Sierra Club wanted further explanation of when the site would be considered closed for the purposes of stabilizing and protecting streambank areas.

Most voted for the industry version. I and 6 others voted for no change from the Corps version. The Sierra Club version will also be submitted.

7. Corps rules said that any aggregate, fines, or oversized material removed from the site shall be placed in an upland, non-wetland site that has been approved by the landowner. No material that results from excavation may be stockpiled or otherwise placed into flowing water or placed against the streambanks as bank stabilization.

We unanimously changed the wording to say that the material shall be placed beyond the high bank (rather than “upland site”), and that the material couldn’t be used as bank stabilization unless specifically authorized by a state or federal permit.

8. Corps rules: All sand and gravel washing, crushing, and sorting shall be conducted above the high bank, in a non-wetland area and away from areas that flood, such that gravel, silt, and wash water that is warm, stagnant, or contains silty material cannot enter the stream or any wetland. All fines resulting from sorting shall be captured in a transport truck or other suitable container and removed from the sorting location to a suitable disposal site the same day that the sorting occurs.

While this gives maximum protection from silt and other material entering the stream from these operations, most of us felt it was a little too stringent. We opted for wording that changed “areas that flood” to “areas that frequently flood”, figuring that in major flood events the amount of silt entering from any operation would be insignificant compared to the amount already traveling down the stream. We also deleted the requirement that fines would be transported out of the area the same day.

Sierra Club and Coalition for the Environment voted for no change, so that option will also be submitted.

9. Corps rules said that spawning season restrictions shall be followed. This came about because it was being considered that streams would be closed to gravel dredging during the major gamefish spawning seasons, to keep silt and disturbance from affecting spawning.

We decided that if gravel mining is done as required by the other rules, that was adequate protection for spawning, and so most of us voted to drop this rule. But several voted to keep it, so both options will be submitted.

10. Corps rule: Vehicles and other equipment shall be limited to removal sites and existing crossings. Streams shall be crossed perpendicular to the direction of the stream.

The miners wanted to change this to saying that water shall be crossed as perpendicular to the stream flow as possible—giving them so wiggle room to take roads up and down the stream bed. This option and the no change option will both be submitted.

11. Corps rule: Fuel, oil, and other wastes and equipment containing such wastes shall not be stored or released at any location between the high banks or in a manner that would enter the stream channel.

This rule had unanimous support.

12. Corps rule: Operators that require a permit for storm water run-off and/or gravel washing shall secure such permit.

We dropped this item as redundant.

13. Corps rule: Instream sand and gravel operations are prohibited from those waters listed as “Outstanding State Resource Waters” or “Outstanding National Resource Waters”.

This was interesting and contentious. Several people asked how some stream sections were listed as Outstanding Resource Waters. The national Outstanding Resource waters mainly include federally owned stream sections such as the Current and Eleven Point rivers. But there are a number of small stream sections listed by the state. Most are on state-owned land, but several were probably listed because they are the recharge areas for large Ozark springs. The gravel mining supporters, especially the farm bureau and property rights people, rejected this notion altogether.

At any rate, the miners and their allies voted to change the rule by adding it onto a later rule concerning endangered species, and making it so that “Outstanding Resource Waters may be reviewed individually for specific consideration that must be met to preserve these stream reaches during the mining activity.” In other words, they could dig in them if they were extra careful. It was pointed out that the word “may” means something a lot different than the word “shall”, so a couple of people voted for this version with “shall” instead of “may”. The rest of us voted for no change.

14. Corps rule: If any part of the authorized work is performed by a contractor or third party, these conditions shall be discussed with the contractor or party. A copy shall be given to the contractor or other party involved.

Most of us figured that this didn't need to be said, since the original company would still be liable for protection and damages. Most of us voted to drop this item, but a few voted to keep it with the addition that the permittee would remain responsible for the conditions of the permit.

15. Corps rule: Operators shall consult with the MO Department of Conservation and the U.S. Fish and Wildlife Service as to the presence of threatened or endangered species in the stream reach where mining occurs or will occur, in order to avoid jeopardizing the species' continued existence or destroying or adversely modifying the habitat of such species.

After wanting to put the Outstanding Resource Waters section onto this section, the miners and their allies voted to drop it altogether. The rest of us voted to keep it, but make it so that the Land Reclamation Program would coordinate with appropriate agencies during the permitting process, thus taking the requirement for this off the operator.

Those were the extent of the rules. The gravel miners themselves, while working to minimize rules as much as possible, were actually fairly reasonable. They seemed to recognize the need for some regulation, and wanted the rules to be clear enough to allow them to follow them. Their allies, on the other hand, were opposed to ANY regulation, and though they voted with the miners, they would have preferred to not give DNR authority to regulate at all. The county commissioners seemed to be convinced that the economic benefits to their counties from gravel digging were important enough to allow it unimpeded. When it was pointed out to them that the economic benefits of having unspoiled streams that attract canoeists, anglers, and other tourism was probably a lot more important, they said that they believed that digging the gravel was good for the stream, and that if it wasn't dug the streams would all get so full of gravel that you couldn't get a canoe down them. This was a recurring theme among the commissioners, the farm bureau, and the property rights people. No matter how many studies on the detrimental effects of gravel mining they were shown, they refused to believe that it was a bad thing. When they were shown actual instances of stream bank erosion, bridges washed out, pipelines exposed, and other damage, they questioned whether it had actually been caused by gravel mining. They repeatedly downplayed or ignored the obvious effects on fish and wildlife, feeling it much more important that the landowner was able to move the gravel around or have it removed. In many instances, they said they WANTED to be able to change the stream channel by removing gravel, in order to protect their bottom fields from erosion. They seemed to still buy into every old idea of altering the stream channel in order to protect their land, even though those ideas have been repeatedly shown to make things worse instead of better. It was very frustrating to those of us who follow the science and understand the hydrology of Ozark streams.

The workgroup moderator and the DNR also made a couple of what I consider mistakes. For one thing, midway through the process they brought in a Geologic Survey representative who gave a program on a proposed study that the Geological Survey is considering on the effects of gravel mining on Missouri Ozark streams. A similar study has already been done in Arkansas, as well as other states, so there is some question of the value of another study. But the gravel mining people and their allies immediately seized upon this as an excuse to not do anything right now to regulate the mining, and

instead to wait for the results of the study, which wouldn't be completed for several years.

The other mistake was that the moderator allowed us to vote on whether the proposed rules would be actual rules, or just guidelines. If they were only considered guidelines, the miners would obviously not be forced to follow them. The miners said that they would have an interest in following them anyway, since if they did not follow them and the stream resource was damaged, the miners would be held liable. The DNR again pointed out that the goal was to PREVENT damage, not punish the miners after it happened, and that this could only be insured by requiring the miners to operate responsibly, not just encourage them to do so. Since the miners and their allies outnumbered us, the vote went their way. It should have been largely meaningless, as the Land Reclamation would have the final say on whether they were rules or guidelines, and should opt for rules. However, the county commissioners ended up obtaining a resolution from the County Commissioners Association of Missouri in opposition to making these rules instead of guidelines.

So where things stand now is that the Land Reclamation Commission will get our recommendations on January 30. This will be in an open public meeting, so we can attend and voice our thoughts, but no action will be taken at the meeting, since the Commission will have to study the recommendations before moving forward with rulemaking. However, I believe that it might be a good idea for some of us to be present, to counter any presence of the pro-mining people. It will also be important for us to keep abreast of all public comment periods, and be as vocal as possible. The DNR needs to know they have support for stringent rules. We also need, as organizations, to come up with our own resolutions supporting rules rather than guidelines, to counteract the actions of the county commissioners.