DOUBLE BAYOU WATERSHED PARTNERSHIP
Wastewater/Septic Systems Workgroup Meeting
August 19, 2014
5:30 – 7:30 PM
Chambers Recovery Team

MEETING SUMMARY

Stakeholders: Kim Laird, Lisa Marshall (GBEP), Jerry Shadden, Deck Shaver, Rex Tunze, Pudge Willcox

Project Team: Ryan Bare (HARC), Abby Ficklin (Shead), Stephanie Glenn (HARC), Brian Koch (TSSWCB), Linda Shead (Shead)

1. Sign-In, Welcome, Introductions, Agenda Review – Linda Shead

Following introductions, Linda thanked everyone for attending, and noted the availability of copies of agendas, meeting notes, and maps, plus the snacks.

Linda then reviewed the results from the previous meeting, with the large map showing the dots for the locations of *septic systems* and a flip chart (below) showing the rates of potentially contributing sources:

Potential Source	Scenario	Load Rate Factors		
Wastewater Treatment Plant	*Normal Flow (permitted limit)*	126 CFU / 100 mL (permit level)		
	High Flow	> 24,000 CFU/100 mL (highest observed rain event)		
OSSFs (Onsite Sewage Facilities) (septic systems)	*Age:*	0-15 yrs	16-30 yrs	≥ 31 yrs
	Low Failure Rate	30%	50%	50%
	High Failure Rate	50%	50%	50%

The locations of the septic systems had been established by the newer registrations with the County and H-GAC, and by a stakeholder map. The ages were estimated through discussion of the workgroup on a neighborhood-by-neighborhood basis. The ages were lumped into three groups: 0-15 years old, 16-30 years old, and more than 30 years old. The workgroup had also assigned approximate failure rates. The model assigns effective rates of septic systems based on soils, age, and failure rates. The flip chart summarizes these factors, as they were made to the General Meeting in June.

The model was run with two different failure rates – low and high. Based on the recommendations from the last meeting, the low-failure-rate run used 30% for the newer systems (since they might not all be well-maintained), and 50% failure rate for all others. A high-failure-rate run used 50% failure rate for all systems.

For the *wastewater treatment plant*, the two runs were for "normal" flow and for a high rainfall event for the *high scenario*. The group had agreed to use the permitted rate (126 CFU/100 ml) for the normal flow, and the highest rate observed so far during sampling (which was 24,000 CFU/100 ml during a rain event) for the *high scenario*. These are numbers for the outfall from the treatment plant, which means they are actual bacteria loads going straight into the bayou, unlike the potential loads from animals or septic systems, which are what is possibly going onto the land, but not all of which goes into the bayou.

Based on looking at the summary and results, some stakeholders thought the septic system failure rates seemed high. The project team noted that the purpose of the meeting is to get stakeholder input, and the rates can be re-visited after all the results have been presented. The project team also reminded the folks that, with septic systems, unlike the wastewater treatment plant, not all of the potential bacteria load will necessarily get to the bayou.

2. Updated Watershed Landcover and SELECT Model Results for Potential Bacteria Contributions – Stephanie Glenn

Because the SELECT model is comparing potential loads in the watershed, it is important to see the overall results, so Stephanie next presented the preliminary results for all sources.

<u>Landcover</u>

The landcover that everyone decided on started from 2010 C-CAP data, followed by several stakeholder reviews – in a task force, in workgroups, and then at the general meeting. The stakeholder input resulted in changes to the map seen today. The SELECT model works by calculating subwatersheds or drainage basins within the watershed, to apply loads in those subwatersheds, based on the landcover in those areas.

High and *low scenarios*[1] were used for many of the sources. For example, for cows, septic, and feral hogs, what is the worst possible? The *high scenario* is the one to use for

---

[1] Following this meeting, the labels for the different scenarios were changed to "*upper scenario*" and "*lower scenario*" (and "*middle scenario*" in one case), to lessen any confusion with "high" and "low" subwatershed loads.

application of BMPs – to have the most effect. A *low scenario* was also run, for off years or other times.

For those who haven't attended before, Linda reviewed briefly how the model works. For example, the model would only put cows on pasture (based on what stakeholders said was pasture land). It wouldn't put cows in forested areas or rice fields. Similarly, it's going to put deer in the forested area, because that's where they most typically would be found. That is why it's so important to get the landcover right, and why small group meetings were held to talk about the landcover, and also the big group meetings to get agreement from everyone.

<u>Totals</u>

In two introductory slides, the total load from all inputs was presented (individual results to be presented next). The first run used *high scenario* numbers, if they exist. On the right, the main potential contributing source loads for each subwatershed are shown in the pie charts. At the end of the presentation, the overall contributions for each of the potential source loads will be presented. The second run was for the *low scenario*s.

The color chart used for the maps and numbers is the same for each of the slides, with yellow being the highest load, and dark blue, the lowest load. The load is measured in colony forming units (CFU) of bacteria, based on someone counting those colonies of bacteria under a microscope. The highest possible potential subwatershed load, in the *low scenario*, is 4.8×10^{12}, and it is shown in two other ways: 4.8 trillion and 4,800,000,000,000. Thus, 4.8 trillion is the highest subwatershed contribution for the *low scenario*, while 42 billion is the lowest potential subwatershed contribution for the *low scenario*. With everything at the *high scenario* levels, 5.4 trillion is the highest potential subwatershed contribution, 54 billion is the lowest potential subwatershed contribution. The colors don't change that much between the *high scenario* and *low scenario* (that is, the high subwatersheds stay high, and low subwatersheds stay low).

<u>Wastewater Treatment Plant</u>

Next is the wastewater treatment plant, and obviously it doesn't move around. It's in one place, and it's contained within one subwatershed. As previously mentioned, for the *high scenario,* the highest sample taken so far was used, and it was during one big rain event at the wastewater treatment plant, with 24,000 CFU of bacteria. The calculated potential contribution source in that subwatershed is 1.8 trillion CFU. Then the *low scenario* brings that down to 9.5 billion CFU.

<u>Septic</u>

The workgroup last time and the stakeholder group later went through and were able to circle septic system areas and assign them into one of three age groups. The total was 459 septics. Again, the way the model calculates the potential loads from the septic has to do with the type of soils, the age of the septic system, and the failure rate of the septic system. At the last meeting, it was decided that the *low scenario* would have a 30% failure rate for the newer, which is 0-15 years old, and 50% for the others. The *high scenario* used the 50% failure rate overall. The resulting highest potential subwatershed loads are 5 billion CFU in the *high scenario,* and 4.8 billion for the *low scenario*. There is not that much difference between the *high scenario* and *low scenario*. The main subwatersheds with high loads are what you would expect from the clusters septic systems.

Regarding a question about the role of soil, Stephanie noted that the results have a lot to do with the soil – that there is not good soil in this area for septic systems, because the water flows right through without being retained in the soil, which means the bacteria also flow out easily. However, overall there is not much difference in that type of soil throughout the watershed.

Another point about the results is that the brightly colored subwatersheds, with the higher bacteria potential, simply means that there are more septics and/or that they are older septics with higher failure rates in that subwatershed. That happens throughout the process – more of the source means more of the potential bacteria. It does not predict what reaches the stream, except in the case of the wastewater plant, where the results are from the plant outfall to a stream. Everywhere else, there may be vegetation that retains some of the bacteria.

The workgroup members were excellent at being able to estimate the ages of the septic systems, but estimates of failure rates are much more difficult. EPA uses a general failure rate of 50% for those systems over 20 years old, which is close to what was used in the model. The local rates can definitely be reconsidered by the workgroup, and it would be best to discuss that after considering all the results.

<u>Cattle</u>

The map on the left showed the input land use for cattle – grassland/pasture and scrub/shrub. The Ag workgroup decided to go with stocking rates for cattle density, and drew on the map where the stocking rates were thought to occur. Four different levels were identified: 1 acre/animal unit (AU); 7-8, acres/AU; 9 acres/AU; and 12-15 acres/AU. In the *high scenario*, the high values of 8 and 15 ac/AU were used (for the two variable densities). In the *low scenario,* the model was run with the 7 and 12 ac/AU. The input stocking rates for the *high scenario* resulted in a total input number of cattle of 4,074, which was very, very close to what TX Ag statistics said for the Chambers/Liberty portion of the watershed (about 4,300). With that, the cattle load in the highest potential subwatershed was 4.2 trillion CFU/day (yellows and green areas), and the lowest potential subwatershed had 21 billion CFU/day. For the *low scenario,* the total input is 3,494 cows – about 500 less cows than the *high scenario*. The highest potential subwatershed load for the *low scenario w*as 3.7 trillion CFU/day, and the lowest potential subwatershed load was 17 billion CFU/day. The difference is not huge, but there is a difference between those two.

<u>Horses</u>

Horse only had one scenario, with an input of 294, based on the census of Ag statistics. The Ag workgroup agreed on that number in the watershed, and they agreed on the grassland/pasture and scrub/shrub landcover for the horse. Folks did not think there was any concentration of horses anywhere, and so decided to apply them evenly to all of the appropriate landcover. The sense was that the horses are mostly being used for ranching operations or as pets, and not being raised to sell. The model results were 9.6 billion CFU (for the highest potential subwatershed load) with potential 87 million CFU (for the lowest potential subwatershed load).

For those new to the workgroup, there are actually numbers published on average excrement rates per animal and the average amount of bacteria per excrement. So, that is how they come up with these bacteria potential loads per day per animal unit.

Goats

There are no goats in the Ag statistics for Chambers County. The workgroup determined that there were, however, a fair number of goats in the County – though not for production, but rather as pets or maintenance type animals for the household. They decided on the number 200, and the landcover to be the same as for horses. The goats were then applied equally to the scrub/shrub and grassland/pasture landcover. The highest potential subwatershed load was 31 billion CFU/day, and the lowest potential subwatershed load was 280 million CFU/day. The higher and lower subwatersheds were somewhat the same locations as the horse, because of the same land use.

Feral Hogs

For feral hogs, there was input from both the Ag workgroup and the hunting/recreation workgroup. One thing about feral hogs is they don't have sweat glands, so they tend to congregate in areas with water. So, a "buffer zone" of 100 meters was drawn around all of the waterways in the watershed. Feral hogs congregate in these areas and feed at night/day or whenever they are not wandering. In this watershed, because of the rice fields that get flooded, the workgroups determined those fields would also be a conduit for the feral hog, because they would want take advantage of that water space, also.

There are no state surveys of feral hogs, because they are considered a nuisance species, so TPWD doesn't conduct surveys of them. Both Texas Water Resource Institute and Texas A&M have done a lot of studies, complete with surveys. Those studies suggested 3 different rates for feral hogs. The high density is 33.8 acres/hog; 50acres/hog is the medium; and 70 acres/hog is the low. Using those number, the *high scenario* applied the 33.8ac/hog to all the water areas, and then 50 acres/hog everywhere else. The *low scenario* applied that same 33.8 ac/hog to the water areas, and 70 acres/hog everywhere else. Given that, the amount of feral hogs in the watershed for the *high scenario* was 1,500, and it was about 1350 for the *low scenario*. In the *high scenario*, the resulting highest potential subwatershed bacteria load was 1.1 trillion CFU/day, and 30 billion CFU/day was the lowest potential subwatershed bacteria load. In the *low scenario* it comes down to 1 trillion CFU/day and 22 billion CFU/day. Feral hogs are more difficult simply because there are not any official survey numbers, but both TAMU and TWRI have done extensive research on them, so there is a precedent for those numbers.

Deer

Deer are surveyed by TPWD in what they call a resource management unit. So, using the numbers for the resource management unit of this area, the number of deer that would be in the watershed was calculated and then applied equally to the mixed forested and forested wetland landcover categories. The resulting bacteria load was about 1.9 billion CFU/day in the highest potential subwatershed and 3.3 million CFU/day in the lowest potential subwatershed. The highest potential subwatershed loads are those with the most mixed forested/forested wetland categories of landcover.

Total Watershed Sum Potential

The final table is the Total Watershed Sum Potential Daily CFU. This takes all the subwatersheds and adds up all those potential loads. From highest to lowest in the table, cattle runs the highest with its *high scenario* of about 27 trillion; feral hog *high scenario* is 11 trillion; the wastewater treatment plant on that high day is 1.8 trillion; goat is 240 billion; horse is 78 billion; septic *high scenario* is 17 billion; wastewater treatment plant *low scenario* is 9.5 billion; and deer is at 7.2 billion. What this exercise does is helps realize where in the watershed there it will be to better place the most applicable BMPs. For example, it would be best to focus deer BMPs on that lower east side area because that is where we have determined most of our load of deer might be. If one thinks of the bacteria load as a bucket, every little thing put in there counts. One of the comments from the last meeting was, why worry about deer, since other contributions are so much higher? The answer is that every little thing counts, and some BMPs are easier to put into place than others.

3. Discussion

Upon being asked, stakeholders did not express surprise at the results. Discussion continued on the appropriate failure rates for *septic systems* in the watershed. Some of the factors that were discussed included: failure rates observed in other watersheds in the state have been as low as 12-15% and as high as 90%; there is some lack of maintenance of newer systems after two years; failing systems are often found in lower income areas where affordability is an issue; identifying problems can help bring funding for assistance; reporting higher failure rates in the plan does not result in enforcement actions; more education is occurring to bring maintenance rates up; and that septic failures are not necessarily directly linked to water in the bayous. The group agreed that some adjustment in the failure rates made sense (see table below). Clarifications were discussed regarding whether certain subdivisions were located within the watershed.

Regarding the *wastewater treatment plant*, a stakeholder noted that the City's Discharge Monitoring Reports (to the TCEQ) show many daily averages well below the permit limit of 126 CFU/100 mL. The group agreed to add a third scenario of the bacteria geomean during dry weather flows, as far back as bacteria levels were reported (probably about 1.5 years – when the permit was last renewed). Also, the bacteria numbers for the highest flow may increase, as the lab refines the process for getting the dilutions adjusted for those high flows.

The project team reiterated that the issue is not the plant itself, but the infiltration, and finding the funding to address that. A huge difference in water quality could be made by addressing the high flow bacteria loads.

Potential Source	Scenario	Load Rate Factors
Wastewater	*Low Flow*	Compute the dry-weather geomean

Potential Source	Scenario	Load Rate Factors		
Treatment Plant	*Normal Flow (permitted limit)*	126 CFU / 100 mL (permit limit)		
	High Flow	> 24,000 CFU/100 mL (highest observed rain event)		
OSSFs	*System Age:*	*0-15 yrs*	*16-30 yrs*	*≥ 31 yrs*
(Onsite Sewage Facilities)	*Low Failure Rate*	30%	40%	50%
(septic systems)	*High Failure Rate*	40%	40%	50%

The comparison of subwatersheds with higher bacteria loads was discussed, noting that finding funds to address the greatest relative load would have the most impact on water quality. The list of potential management measures that the workgroup had suggested at a previous meeting was briefly reviewed, noting that more extensive review/discussion will take place after the water quality sampling results are known, and that the results of the modeling will be used to help target locations for potential management practices. Also reiterated was that the watershed protection plan process allows for a completely voluntary solution to the water quality issues in Double Bayou, avoiding regulatory answers.

The next step will be to take the modeling results to the general meeting, likely on October 21st. Sometime after that, the workgroup will meet again to talk about the water quality sampling results and how they are related to all these potential loads.

A stakeholder asked about pursuing additional funding to do Bacteria Source Tracking, based on a workshop provided at H-GAC in Houston. If stakeholders want that, the project team will look for funding. Although the cost might be just $475 per sample, as noted during the workshop that some attended, such a study would cost much more that that – particularly in developing a library of samples for comparison. It would have to be specific to this, or a very similar coastal, area. There are many different kinds of *E. coli*, and what animals are eating affects the bacteria in their waste, plus it could even vary from one side of the bay to another. Also, samples need to be taken more than one time – in case, for example, there were a carcass in the water, or if it were waterfowl hunting season. Probably, a good plan would include four different points, at least three times each, and during both rain and dry events.

Another consideration is whether/how the results would help in developing a plan to improve water quality. For example, many of the BST study results end up with a very large percentage of wildlife – avian or otherwise – and killing birds or wildlife would not be a practical solution (or even legal, for some situations). In 3-4 watersheds in south central and central Texas, BST results have been in the range of: 50-55% wildlife/birds; 15-20% livestock, 15% human (septic or wastewater), and then unknown of 20-25%. So, will knowing such results help solve the problem?

One possibility of a situation where BST might help could be, for example, in subwatersheds where there was a potential for high bacteria levels to be coming from more than one source – say the collection system and failing septic systems and cattle. Another example might be a subwatershed with both cattle and feral hogs as potential major contributors. Then, knowing which was the largest contributor in the water would enable stakeholders to decide where best to use funding. Another consideration could be how much difference a particular management measure could make or how much it would cost, such as, would septic system education work better, or getting sewer systems expanded, or education about capacity of the land to support livestock?

The science is continuing to improve. They can now distinguish between feral hogs and wildlife. Five years ago, the data from port-o-potties were only showing 70% human – so, that's a problem. Still, there continues to be a very large unknown factor. Basically, it's another tool in the tool box, but would have to be implemented with a full scope, and caution.

4. Wrap-Up and Next Steps

Linda noted that the suggested model modifications were good, as was the BST discussion. The group agreed that another workgroup meeting would not be needed before the October general meeting, and the project team agreed to send them the results from a new run with revised scenarios for wastewater and septic, and the summary table.

5. Adjourn

Linda thanked everyone before the meeting adjourned.