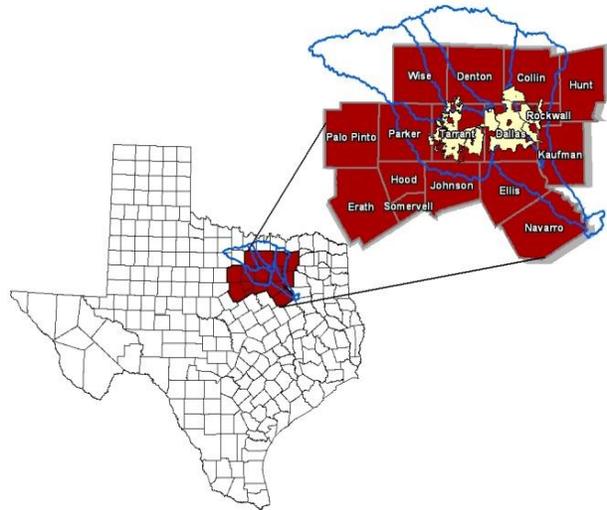


Balancing Compliance with Science: The Ups and Downs of a Regional Approach to Storm Water Monitoring

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ABSTRACT

The nine Phase I entities in the Dallas-Fort Worth Metroplex of North Central Texas, which include the Cities of Dallas, Fort Worth, Arlington, Irving, Garland, Plano and Mesquite and two transportation agencies - TxDOT Dallas District and the North Texas Tollway Authority, have been working to cooperatively manage certain aspects of their storm water permits for almost 20 years. Although each entity has its own individualized permit and implements the majority of their program's components independently, each entity participates successfully in a regional monitoring program. The Dallas-Fort Worth Regional Wet Weather Characterization Program (RWWCP) was first



negotiated with the United States Environmental Protection Agency (USEPA) and incorporated into each entity's permit for the first term in 1996. The negotiated program reduced the number of sampling stations from the application phase of sampling but increased the number of samples per station to obtain better statistical representation; in essence, better science. For the next permit term, a new approach was taken. Whereas in the first permit term, a few in-stream sites were evaluated along with the required outfall monitoring; for the second term, the new approach included a complete network of in-stream sampling stations supplemented with nine biomonitoring sites. The argument was that a baseline of receiving stream water quality data during storm events was needed to measure progress and improvements resulting from the storm water management programs being implemented by each entity. Working with the Texas Commission on Environmental Quality, a unique regional option was added to each of the Phase I permits of the North Central Texas permittees. Details of the regional sampling program were not included in the permit so that any future modifications would not require formal permit amendments. Now that this permit term's sampling effort is over, the results of the sampling are being presented in another paper at this conference. For the next and third permit term, modifications are again being made to the regional monitoring program. Rather than using a standard "one-size-fits-all" approach, entities in the regional program are customizing a basic template with the initial target of monitoring at least one half of their jurisdictional area by the end of the permit term while capturing at least two years worth of sampling data at each station. This paper will address some of the caveats and modifications that were incorporated by each entity while addressing some of the social and political issues that each entity faced "back home" in striking a balance between permit compliance and good science. Benefits of a cooperative program such as cost-savings and presenting a unifying front to regulators have to be weighed against such things as the loss of autonomy and justifying internal staff resources. A panel discussion from several members of the North Central Texas coalition will highlight some of their diverse experiences with the regional program.

INTRODUCTION

When the USEPA issued its National Pollutant Discharge Elimination System (NPDES) Phase I rules for large and medium municipal separate storm sewer systems (MS4s) in 1990, seven cities and two local districts of the Texas Department of Transportation (TxDOT) in the North Central Texas area were affected and had to go through the extensive two part application process. The cities are Dallas, Fort Worth, Arlington, Irving, Garland, Plano and Mesquite. Although all fit the Phase I criteria of having a 1990 population size greater than 100,000, the cities currently range in size from 138,000 (Mesquite) to 1.3 million (Dallas) (see Table 1). These differences in size, along with other differences in structure and political climate, have influenced the way staff in these cities has dealt with the regulatory requirements. The North Central Texas area itself has some unique characteristics that have influenced the way all of these communities have addressed these regulations. The North Central Texas

metropolitan area boasts a rising population of more than 6.6 million people and an area of 12,800 square miles. Although most widely recognized by the two largest cities of Dallas and Fort Worth (DFW area), the area is divided jurisdictionally into 16 counties and almost 200 local governments. The North Central Texas Council of Governments (NCTCOG) is the metropolitan planning agency for this 16-county region whose role is to assist local governments in *planning for common needs, cooperating for mutual benefit, and coordinating for sound regional*

development. Its purpose is to strengthen both the individual and the collective power of local governments, eliminate unnecessary duplication, and make joint regional decisions for mutual benefit. Hydrologically, the region is located in the upper Trinity River Basin with three major tributaries of the Trinity River draining the area – West Fork, Elm Fork, and East Fork and 408 of the 12-digit hydrologic unit classification (HUC-12) subwatersheds. The jurisdictions of the seven Phase I entities cover 108 of these subwatersheds (Figure 2). Mean annual rainfall varies significantly from 36 inches in the east to 31 inches in the western side of the region. It is a large area with many contrasts, many differences in economic growth and development, in socioeconomic background and culture, yet unified by a common need and a Texas spirit of friendly cooperation. This paper examines the interaction that has occurred between the local governments in this area over the past twenty years, particularly with regard to how they addressed the wet weather characterization element of their NPDES permits.

FROM APPLICATION TO PERMIT THREE

In response to the pending NPDES regulations, a Regional Urban Storm Water Management Task Force was formed by NCTCOG in 1989 from representatives of the seven entities and a few other interested parties. A regional approach was taken then to co-develop many of the required elements of the permit application and process including a regionwide public education campaign with a unifying logo – *It's Our Water, Take it Personally!*, a cooperative dry weather field screening mapping and data collection initiative, a construction BMP manual, an industrial BMP manual, a source and treatment control manual addressing residential and commercial areas, a model storm water ordinance, and a regional wet weather monitoring program.



Table 1: Size Comparison of DFW Phase I Entities

Entity	Population (2009 NCTCOG Estimates)	Total Number of Watersheds	Square Miles
Dallas	1,306,350	32	385.92
Fort Worth	720,250	31	344.67
Arlington	370,450	11	98.57
Plano	263,800	9	72.25
Garland	228,350	8	57.16
Irving	212,250	8	67.88
Mesquite	137,850	7	46.36

Note: Transportation entities are not included in this comparison

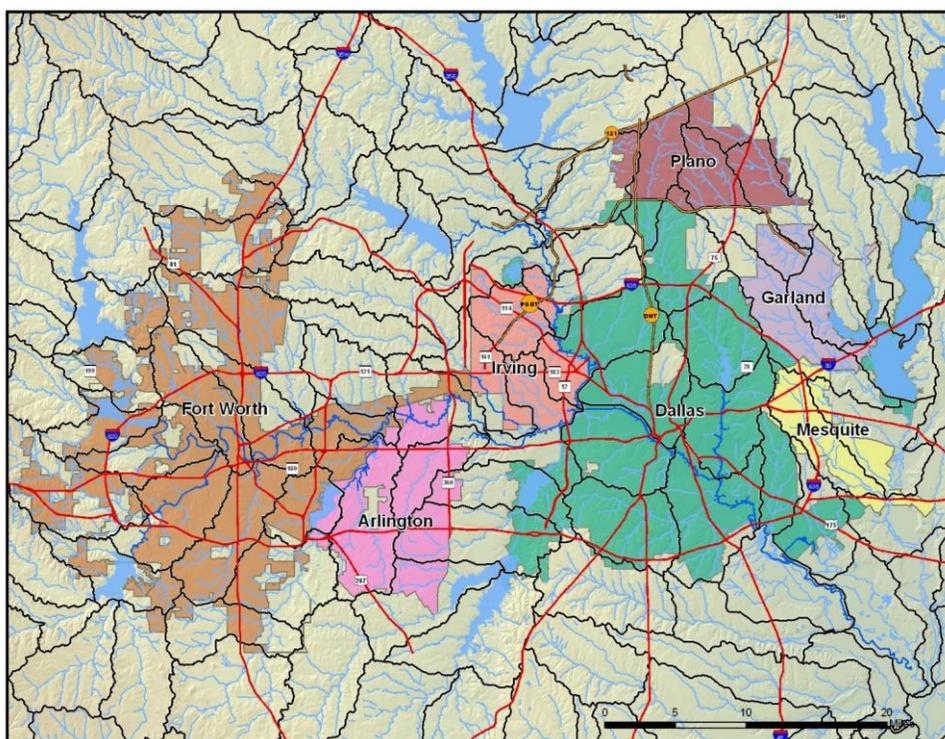


Figure 2: Map of DFW HUC-12 Subwatersheds and Jurisdictional Boundaries

From the very beginning, the regional initiative was interested in doing more than just complying with the regulations. To ensure the scientific validity of the data being collected, the initial monitoring effort utilized the U.S. Geological Survey (USGS) to set up a network of 30 sampling stations across the region and to analyze for 188 selected properties and constituents at each of the sites during 1992-94. However, a balance was sought between scientific validity and cost-effectiveness. Through extensive negotiations with EPA Region 6, approval was received to reduce the mandated regulatory requirement of up to 10 monitoring locations per entity to an average of three sites but to increase the total number of samples from the required three up to seven so that there was no net loss in the total number of sampling events. The amount of sampling equipment and manpower needed was reduced, and yet the statistical robustness of the data was vastly improved. Following the regulatory requirements for discharge characterization, sites were selected in small (160 acres or less) drainage basins, each categorized by a single predominant land use (11 residential, 9 industrial, 6 commercial, and 4 highway). From these monitoring sites, 210 storm events were sampled over the two year period.

Following a statistical network analysis of the initial application-phase sampling effort by the USGS, a recommendation was made to deactivate 15 of the original 30 sites for redundancy and to add seven new sites with new characteristics: One of the sites would sample an undeveloped watershed while the rest would sample larger mixed land use watersheds, three of which were at least 2,500 acres and took samples from the channel (i.e in-stream) instead of from an outfall. These recommendations were approved by EPA Region 6 after the coalition agreed to add biomonitoring activities that were already being implemented in both Dallas and Fort Worth. In addition, the 188 constituent list was reduced to 33 key parameters. Once approved, the entities moved into a five-year permit phase (1997 – 2001) and during this first permit compliance term, over 330 storm event samples were taken. Since the language in each entity’s permit spelled out a specific annual sampling schedule, once the permit term was over, all monitoring stopped although other elements of their permit which were identified as “on-going” had to continue through the permit renewal process.

After a long hiatus during which NPDES permit responsibilities transferred to the Texas Commission on Environmental Quality (TCEQ), the regional monitoring program entered into negotiations with TCEQ for a new monitoring strategy for the Regional Wet Weather Characterization Plan (RWWCP) that was approved in 2003 and began in 2006. At this point, the regional monitoring partnership changed slightly with one local TxDOT district becoming a co-permittee and another transportation agency, the North Texas Tollway Authority (NTTA) changing status from co-permittee to permittee. Recognizing that the outfall monitoring of small, single land use watersheds was giving little information on overall impact of urban runoff to receiving streams, the regional coalition proposed moving to a network of only in-stream stations. A standardized approach was formulated for all partners where each would sample quarterly from three locations in a single jurisdictional watershed and would rotate to a new watershed in their respective jurisdictions each year for three years (2007-2009) (Figure 2). The analytical constituent list was further reduced to 18 parameters. The intent was to obtain a baseline of in-stream conditions in order to track BMP activity and effectiveness occurring in each jurisdiction as a result of each entity's storm water management program. By the end of the sampling period, 185 storm events had been analyzed.

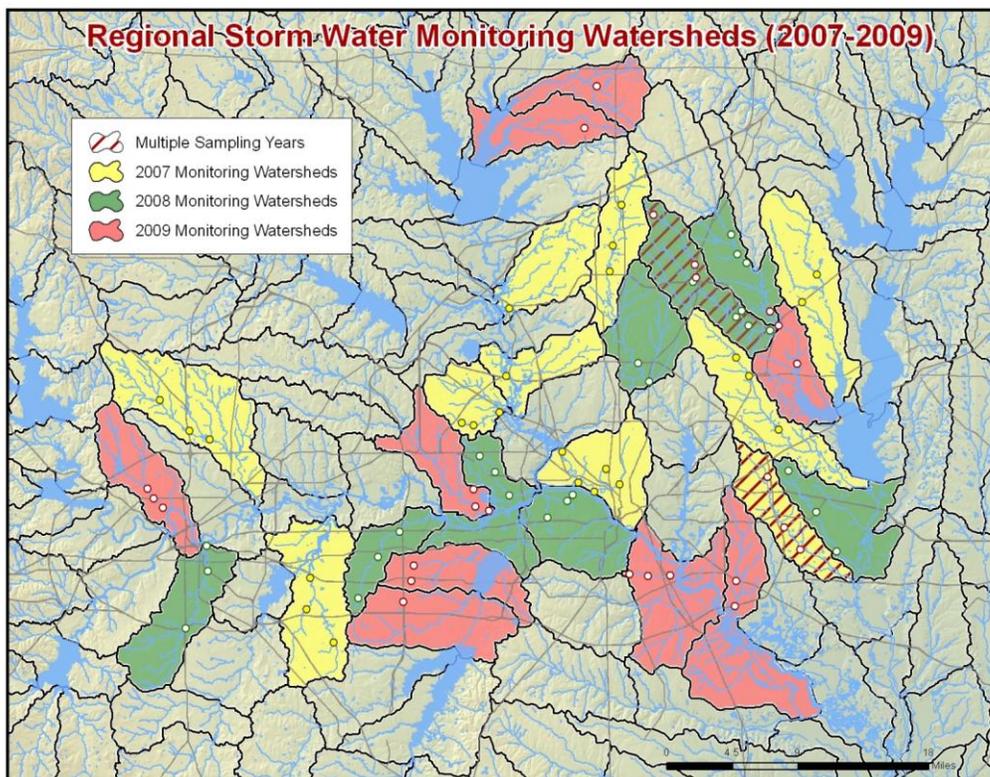


Figure 2: DFW Wet Weather Monitoring Watersheds for the Second Permit Term (2007-2009)

The standardized, “one-size-fits-all” approach fit most entities with a couple of exceptions. The two transportation agencies were only required to sample at two locations instead of three in each watershed due to limitations in finding multiple highway stream crossings in a single watershed. Consistency was maintained among the smaller entities by hiring a single consulting team, PBS&J et al., through the NCTCOG to establish a regional monitoring protocol, set up the monitoring network, and to procure and analyze the samples. Alternatively, the City of Dallas followed the regional protocol using existing staff and equipment and took their samples to the city’s contract laboratory for analysis. While this introduced some minor challenges in data coordination and reporting, they needed to utilize existing staff and resources. Furthermore, in the first year of sampling, the City of Dallas selected a watershed that did not quite conform to the single stream per watershed pattern, so to adequately sample the

multiple tributaries, they installed five stations instead of just three. The City of Fort Worth also decided to use existing staff and in particular, to continue in earnest with their biomonitoring efforts. They reduced their chemical sampling to an annual sample in each of their three watersheds but replaced it with 150% more biomonitoring samples (nine sites sampled twice a year). In the regional program, it has been important to recognize each entity's individual resource needs and to allow some degree of variance while maintaining the overall unified aspect of the regional program. This has been one of the keys to the program's continued success!

At the end of the second permit term's sampling effort, a final summary monitoring report was prepared by the regional consultant, PBS&J, to assess the three-year sampling effort and to make recommendations for the third permit term. Combining a revised approach with many of these recommendations, the regional partners have recently created a sampling plan that will effectively monitor at least 50% of their jurisdictional area by the end of the permit term capturing at least two years worth of sampling data at each station, twice as much as last term. Rather than using a standard "one-size-fits-all" approach as was used in the second term, entities in the regional program are customizing a basic template by making it proportional to their jurisdictional area (i.e. larger entities are sampling more watersheds than smaller entities). This extent of jurisdictional coverage will allow a reasonable assessment of their watersheds while striving to achieve a balance among the various goals of obtaining valid scientific information, meeting permit compliance, and addressing what is practicable for each entity. As in the previous term, this plan continues with in-stream watershed monitoring. As proposed, 24 watersheds will be chemically monitored and at least 12 watersheds will be bioassessed by multiple entities across the region. A summary of the basic tenets of this proposed sampling plan are as follows:

- Each participant has selected watersheds to achieve greater than 50% coverage of their jurisdictional area. By selecting the largest watersheds within their jurisdictions, most entities were able to achieve the 50% coverage with just a couple of watersheds.
- To increase statistical robustness, most watersheds will be sampled over two years.
- Almost all partners are conducting chemical sampling quarterly; Fort Worth is putting a greater effort into the bioassessment work instead.
- The number of sites per watershed varies per entity based on local conditions.
- Arlington, Dallas, Garland, Irving, Mesquite, Plano, NTTA and TxDOT-Dallas will collect samples for the first four years of the five-year permit term.
- Fort Worth has elected to perform chemical monitoring for the entire five-year permit term.
- Dallas, Fort Worth, Garland and Plano will also do biological assessments.

The primary goal of the RWWCP during this permit term will be to continue the assessment of urban impact on receiving stream water quality and to document any improvement presumably resulting from BMP implementation. The data collected during this permit term will build upon the set of regional data needed from each site for meaningful trend analysis. This proposal also includes a more comprehensive biomonitoring component. Since assessing the impact of urban runoff on receiving stream quality is a primary focus of this program, assessing the biological integrity of the streams is fundamental. As of the time of this writing, this proposal has not been submitted and approved by TCEQ although its general concept has been discussed with them and was received favorably. Any revisions and updates will be given at the presentation.

ROLE OF NCTCOG

The role of NCTCOG has also been fundamental to the on-going success of the program and they have manifested many of the tenets initially stated in this paper-- fostering cooperation and communication and strengthening both the individual and the collective power of local governments, eliminating unnecessary duplication, and making joint regional decisions for mutual benefit. NCTCOG storm water program staff is supported through a cost-share funding formula that is based on equal share and a per capita rate. It addresses many more aspects than just monitoring, including public education, illicit discharge and elimination, and pollution prevention. Focusing on just the monitoring component for purposes of this paper, staff coordinates the program by hosting meetings on an as-needed basis, communicating primarily through email. Interlocal agreements are developed with each local governmental entity and are renewed annually. Consultant services are procured through an RFP process by NCTCOG, although the participant representatives make the final selection, and NCTCOG oversees the consultant activities, processes invoices from the consultant for services rendered, bills the participants for the cost-shared amount, and pays the consultant. During permit negotiations with regulatory agencies, NCTCOG staff initiates meetings regarding aspects of the regional monitoring program; however, each entity still negotiates the terms of their individual permit with the regulators on their own. For the last permit term with TCEQ, the details of the regional monitoring program were negotiated before any local permits were issued and then an option for the RWWCP was included in the permit language. Keeping specific details of the RWWCP out of the permit language was specifically negotiated by NCTCOG in order to retain flexibility for the permittees so that changes could be made to the monitoring plan outside of the formal and often lengthy permit modification process. Maintaining a good rapport with the regulators has been critical to NCTCOG's success with these types of negotiations. As issues and problems arise, NCTCOG has recognized its role in trying to resolve them so that the regional partners do not have to, thus allowing the regional partners to focus their efforts on issues within their own jurisdiction. For example, one of the items negotiated with the regulators for the regional monitoring program in this last permit term was to discontinue the use of Discharge Monitoring Reports (DMR) for reporting the storm water discharge data. It was argued that in-stream data is not the same as outfall discharge data and should not be intermixed with it indiscriminately within the national DMR database. However, due an oversight, several permittees were contacted by TCEQ to participate in EPA's mandatory annual QA/QC evaluation of NPDES data. After being notified that this had occurred, NCTCOG staff contacted TCEQ as well as EPA staff to clarify the misunderstanding and although it took numerous phone calls over several days, it eventually was resolved and the requirement was dropped.

INTERNAL CHALLENGES

One of the most challenging aspects of a multi-entity cooperative program is the intrinsic diversity of the partners, each with their own set of internal struggles back home that manifest themselves in various ways. The wide range of sizes in population of these entities was pointed out earlier. Most of the time, larger population size means greater resources to work with and the table of storm water budgets and staff resources (Table 2) bears this out, but it also means more departments, supervisory levels and overall greater complexity in the system that can complicate things significantly. Getting approvals for a contract, a program change, or even just a draft document reviewed, for instance, can be a much longer process with the larger entities. This can generate some frustration among the other partners in the joint monitoring group that may not understand the delays in decisions that bureaucracy can make. Other internal factors unrelated to size of structure, such as frequent organizational changes can have their impact on how smoothly things get done as well since new staff has to be oriented to the process and brought up-to-speed; or perhaps that responsibilities are made unclear by the shifting of department

Table 2: Comparison of DFW Phase I Entity Storm Water Departments

Entity	Years in Position (Monitoring Staff)	Years in Position (Storm Water Coordinator)	Number of Supervisory Levels	Departments Contributing to Annual Report	Number of Storm Water Staff	Storm Water Budget	How Funded?	% of Storm Water Budget Spent on Monitoring Activities
Dallas	<1	1.5	-----	13	25 in storm water dept.; Approx. 250 city wide	Storm Water Dept \$4.8M; Under MS4 Permit ~\$48M	Storm Water Fee	25% department; 3% whole budget
Fort Worth	1	2	3	4	10	\$1M/ \$27M	Environmental Fee (EF) Utility Fee	55% of EF only
Arlington	9	1	4	3	24	\$8.5M	Utility Fee	1%
Plano	7	Same	3	7	3 Full Time; over 30 with responsibilities	\$6 -7 M	Utility Fee	5%
Garland	4	Same	2	8	25	\$3,890,000	Storm Water Fee	6%
Irving	<1	15	5	16	3 Full Time; over 30 with responsibilities	\$4.6M	Mostly Utility Fee Some from general fund	Approx. 7%
Mesquite	11	16	3	7	3	\$2.2M	Utility Fee	8%
NTTA	3	2	3	2	25 overall	\$2.5M	Maintenance Dept Operation Fund	Approx. 5%
TxDOT	9		3	15	1	NA	NA	-----

structure and the increasing potential that things might fall through the cracks. Some of the regional entities have had recent turnover and their staff is relatively new. In fact, most of these entities have monitoring staff with tenures less than 10 years (Table 2). Sometimes it is not just the program staff that gets shifted around, but the upper management staff as well, where the ramifications of being unfamiliar with the program details are potentially greater. One reason local governments reorganize their department structure is to address budgetary concerns. Local government agencies are all facing this stress and are having to reduce and streamline their work force to compensate. One outcome of this is that there is much more scrutiny and overview of proposed spending, even for routine regulatory compliance items. When money gets tight and there is not enough to go around, people tend to agonize over the budget more, resulting in delays and/or multiple revisions which leave a lot of people hanging around waiting. Budgetary constraints continue to be a major internal pressure that all entities face; unfortunately, it seems that environmental regulations tend to be more and more difficult and costly to implement and comply with. Staff often wonders where the money is going to come from to pay for all of these future regulatory “improvements”. They see matters only getting worse once TMDL’s, mandatory retention, and retrofitting of controls for additional pollution prevention really take off.

The top leadership in a city or even a department can also have a significant influence on the direction of an environmental program. In fact, one of the most common remarks heard from storm water monitoring staff was that in many cases, their upper management had little knowledge or technical expertise about their storm water program and either paid too little attention to it or they made decisions that were based more on politics than sound science. In a few cases, this lack of attention worked to the staff’s advantage in that they were given leeway to run the program without much interference, but in most cases, the lack of interest meant their request for more resources were often denied. In one city, the mayor was initially thought of as being very environmentally-minded and there were high hopes that environmental programs would be strengthened; however, as time goes on, less is being accomplished than hoped and more words are spoken than action taken. In another city, an aggressive department head had instituted several strong environmental ordinances, such as requiring permanent BMPs in the subdivision rules and this action was strictly enforced. Unfortunately, once that person left, enforcement stopped and the ordinance is now virtually ignored. On the other hand, in yet another city a new leader has emerged with new ideas and a renewed attention to environmental matters. Consequently, staff has been invigorated and now feels they have a champion in their corner to listen to them and give them the support they need. City councils can also have great sway over the direction of a city’s programs but they can also succumb to political pressure, public sentiment, and the latest trends, all with negative results. Some North Central Texas cities initially challenged the storm water rules and legally contested them quite aggressively. Failing to succeed at these challenges, they have taken a more passive approach to the regulatory requirements and staff has had to follow suit with each decision whether they agreed with them or not. These are realities of city government that can lead to frustrations in trying to follow scientific pursuits such as storm water monitoring. If one staff member is in an environmentally aggressive city and has the freedom to be proactive, it is difficult to work with others in a group that are required by their upper management to just do the “bare minimum”. There have been many discussions among the regional monitoring partners on this topic because of pressures “back home”. Are we striving for valid science or just simple compliance?

When working with a diverse group, one of the most common challenges is the variety of opinions they have which they may or may not share with their respective entity. Some have expressed that in spite of the many years of monitoring that we have done, there are still not many clear results. They point out that a great deal of money has been spent without much to show for it. There is a general frustration that although the storm water permits are supposedly controlling discharge of alleged pollutants to reduce the impact to the receiving stream from urban runoff; it has not been made clear whether the discharges in

this region carry significant pollutants or whether the local streams are truly impacted. They question what we are really monitoring for. If it is to measure the levels of pollutants in urban runoff but we show little to none of them in the samples, then do we really need to continue monitoring? They face pressures back home to spend the money elsewhere and have difficulty justifying the expense without clear results. If the streams to which we are discharging are not impaired, then perhaps urban runoff is not a significant problem in our area? Are we sampling just for compliance sake – because the regulators told us we have to – or are we trying to accomplish something real and worthwhile? One of the partners expressed that in spite of all our efforts to balance compliance with science, we are still doing more for compliance sake than for any real science. Our sampling is event based; we are only taking a minute sample from a very large volume and most things are really too dilute to measure. Some feel that the requirements are too restrictive while others in the group feel they are too lax, that regulations based on voluntary actions are doomed to fail. The regulatory yardstick of MEP (maximum extent practicable) is too vague to be enforceable, so it is not enforced and consequently, only the “bare minimum” or less is done.

Among the internal difficulties that storm water staff often face is dealing with the many departments in the city that are needed to contribute to the storm water annual report. Storm water is a citywide program that involves numerous departments (Table 2). Some departments are cooperative while others are much less so. In one participating city, staff reported that there were some departments that are not very concerned about storm water, do not really understand it and had no desire to learn about it. The directors and senior managers had been in place for a number of years and simply did not want someone telling them how to do things within their departments. Of course, this storm water staff person tried to use diplomacy and establish a good working relationship, but this did not work. The fact that they were lower in the city hierarchy than these directors also made things difficult. They perceived the situation as someone in a subordinate position that lacked authority was trying to tell them what to do. Like storm water personnel in many municipalities, he was in a department where his supervisor and director had minimal storm water knowledge. Storm water was an additional responsibility that they were not very excited to have. Ultimately, the city manager had to get involved. In order to gain his support, the program and regulatory requirements were thoroughly explained to him. Then he sent a letter to each department director that instructed them to participate in and provide assistance to the storm water program. Once everyone was on board, the program began to run much smoother and compliance was easier to achieve. Not every city has had this success in getting everyone on board though. In at least one city, there has been some frustration among staff that works so hard to prepare a noteworthy annual report only to have few if any upper management staff bothering to review it before it is submitted to TCEQ. These internal pressures are real, the questions valid and in many cases, unanswerable, but staff find ways to work around or simply deal with them.

BENEFITS OF THE REGIONAL PROGRAM

Although all of the participating entities have benefitted in various ways from participating in the regional program, it has been especially beneficial for the smaller entities because they have jointly procured the services of a consultant to fulfill the sampling and analysis portions of the monitoring requirement of their permit and NCTCOG to coordinate the program. Their city management has approved of the program because staff is able to meet permit requirements for less cost than if they hired their own consultant or utilized city staff. City staff enjoys it because participating in the regional program is less labor intensive than if they performed the work themselves and staff definitely appreciates the fact that they do not have to come in at 3:00 a.m. to work in the rain. Participating in the regional monitoring program has also seemed to make it easier for all entities, no matter the size, to get activities and the costs associated with them approved by the upper echelons of city leadership. They

are able to do things as part of the regional program that may not necessarily be required by the permit because the other participating cities have agreed to do the same or similar activities. Most municipalities seem to take comfort knowing they are doing what surrounding cities are doing and they are more willing to do more if they know others are going to put forth the same effort. Having standard permit requirements across the region also benefits both the State permitting agency and the local permittees. The program provides a benefit to the entire region as well because it takes a watershed-based approach to sampling and the factors influencing water quality. Watersheds do not follow political boundaries, so by developing this holistic approach, each participant can monitor locally within their jurisdictions, and share the data at a watershed level, to get a better perspective of watershed trends as a whole. Instead of cities spending more time and money on individual efforts and simply focusing on their city, they can have a more effective program that looks at the big picture and those activities that can provide better benefits to the region. One advantage to participating in the regional program is that with all the recent turnover, communities can share ideas and technical expertise. Those with relatively inexperienced staff can depend on the other entities with more experience to help make the scientific decisions and to give insight into programs and activities that have or have not worked. With more people to talk to and to jointly make decisions, greater confidence is felt among the group that we are headed in the right direction. The regional approach to storm water monitoring has allowed for 1) more coordinated and comprehensive water quality sampling; 2) more sound and reliable data collection; 3) cost effectiveness; and 4) a true assessment of regional impact on stream water quality. The RWWCP is the only program in the state allowed to fulfill TPDES permit requirements with in-stream, watershed monitoring. This was likely made possible because of the long term success of the regional partnership, their ability to work together, and their on-going dedication to improving water quality in our region. Through these many years, the regional partners have been able to strike a balance between achieving good science and simply being compliant through good communication, adequate compromise and a desire to achieve something worthwhile.

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