

**Report to Management**  
**Audit of Surface Water Resources**

**October 6, 2010**

**Texas Water Development Board**

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KEY POINTS OF REPORT

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**Overall Conclusion**

Surface Water Resources (SWR) is working hard to cover the regular responsibilities in their ongoing programs as well as diligently addressing their many assignments that have resulted from the Senate Bill (SB) 3 process. Staff members are addressing all of these responsibilities in a professional and well-reasoned manner. They continually show initiative and willingness to take on new assignments and improve technology in furtherance of developing the scientific knowledge required by TWDB in the area water resources.

Performance plans and appraisals are up-to-date as of the end of September 2010. Staff is well-educated and has the experience needed to carry out the assigned responsibilities. Staff has addressed surface water monitoring needs without significant budget increases and in most cases without sacrificing the quantity or quality of data being collected. SWR has kept abreast of the SB 3 process by attending meetings, providing support, and addressing budget and legal requirements.

SWR should address future monitoring needs and the need for more money early in the even numbered fiscal years for out-of-state travel for training. Additional coordination and communication with Information Technology (IT) staff is needed especially in the early stages of computer related projects. SWR does not have specialized safety manuals, safety policies, and in-depth safety training to address risks inherent in field work in studying rivers and streams.

**Key Facts and Observations**

Performance plans and appraisals are up-to-date.

Experienced and well-educated staff is producing quality documentation.

Budgeted funds for monitoring and training are sufficient except for future needs and out-of-state travel.

SB 3 process is complying with legal requirements and staff is providing proper support.

Additional communication and coordination with Information Technology (IT) staff is needed.

Safety issues need to be better addressed.

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**A. Management Summary**

1. Purpose

The purpose of this report is to present the conclusion, observations, recommended action plans, and management responses from the audit of Surface Water Resources. This audit was conducted in accordance with the *International Standards for the Professional Practice of Internal Auditing* and generally accepted government auditing standards.

The government standards require that the audit is planned and performed to obtain sufficient, appropriate evidence to provide a reasonable basis for observations and conclusions based on the selected audit objectives. The evidence obtained provides a reasonable basis for the observations and conclusions based on these objectives.

2. Background

The audit of the Surface Water Resources Division (SWR) was conducted in accordance with Internal Audit's annual audit plan. SWR is one of three divisions in Water Science and Conservation (WSC). SWR is divided into four sections: Bays and Estuaries (B&E), Instream Flows (Instream), Hydrographic Survey (Hydro), and Water Availability Modeling (WAM).

SWR supports TWDB's water resources planning and management efforts by providing scientific and engineering expertise associated with analyzing and providing water-related data to ensure the continued availability of water supplies and the maintenance of the ecological health and productivity of Texas reservoirs, streams, rivers, bays, and estuaries.

In addition to special studies, SWR has numerous ongoing programs, designed to address specific legislative mandates and to provide data related to specific needs. Programs conducted by Instream are generally referred to as SB 2 initiatives. B&E, Instream, and WAM are all involved in SB 3 initiatives on environmental flows.

Activities in the Division include:

- Data collection, evaluation, and dissemination along with model development and interpretation,
- Performance of investigations, surveys, and research studies,
- Preparation of reports,
- Administration of TWDB-sponsored research contracts with universities, government agencies, and private companies, and
- Technical evaluation and review of reports and applications for financial assistance.

Data, models, and results are produced for state water planners, regulators, and other decision makers to use as required. Publications are made available to the state library system. Virtually all surface water data is published and a significant portion is made available to TWDB's customers, partners, and other interested parties via the agency website. Additional data is made available upon request.

Eighteen members of SWR staff were interviewed including all staff in B&E, Instream, and WAM plus the Team Lead for Hydro. Staff members in Finance

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and Operations and Administration (O&A) were also consulted, along with other staff in WSC. A meeting of the Science Advisory Committee (SAC) and a meeting with SWR staff and the Sunset Review Team were also attended.

3. Scope and Objectives

The scope of this audit encompassed the examination and evaluation of the adequacy and effectiveness of the internal controls and quality of performance in carrying out assigned responsibilities. All audit objectives excluded Hydro staff and activities because a review of those responsibilities should be considered in a separate, future audit initiative. The scope included specific program steps designed to assess:

- Accomplishment of goals and objectives,
- Effectiveness and efficiency of operations,
- Compliance with laws, rules, and regulations,
- Reliability and integrity of data, and
- Safeguarding of assets/safety.

The objectives included the following determinations:

- Status of performance plans and appraisals,
- Adequacy of qualifications of staff and quality of documentation,
- Sufficiency of budgetary resources for monitoring state water resources and providing staff training,
- Operation of the SB 3 process in compliance with legal requirements and adequacy of staff performance in support of the process,
- Status of software development, web development, modeling, and other computer related tasks, and
- Adequacy of addressing field safety issues.

4. Conclusion

SWR is working hard to cover the regular responsibilities in their ongoing programs as well as diligently addressing their many assignments that have resulted from the SB 3 process. Staff members are addressing all of these responsibilities in a professional and well-reasoned manner. They continually show initiative and willingness to take on new assignments and improve technology in furtherance of developing the scientific knowledge required by TWDB in the area water resources.

Performance plans and appraisals are up-to-date as of the end of September 2010. Staff is well-educated and has the experience needed to carry out the assigned responsibilities. Staff has addressed surface water monitoring needs without significant budget increases and in most cases without sacrificing the quantity or quality of data being collected. SWR has kept abreast of the SB 3 process by attending meetings, providing support, and addressing budget and legal requirements.

SWR should address future monitoring needs and the need for more money early in the even numbered fiscal years for out-of-state travel for training. Additional coordination and communication with IT staff is needed especially in the early stages of computer related projects. SWR does not have specialized safety

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manuals, safety policies, and in-depth safety training to address risks inherent in field work in studying rivers and streams.

5. Action Plans

The following steps are recommended:

- Management should consider how to provide for potential future needs for monitoring Texas surface water resources. This will be especially important if USGS does not continue to expand the National Streamflow Information Program (NSIP) program. Consideration should be given to funding all ongoing monitoring with general revenue funds.

The Director of SWR should work with the Deputy Executive Administrator (DEA) of WSC to determine the feasibility of allocating more out-of-state travel money to SWR in even numbered fiscal years.

- The DEA of WSC should work closely with SWR management and staff to assure coordination and cooperation with Information Technology (IT) staff is accomplished during the life cycle of computer related projects and especially in the early stages. SWR should consider what projects need to be on the priority list of IT projects and how to ensure that Department of Information Resources (DIR), State Auditor's Office (SAO), Data Center Services (DCS), and other state requirements are met. Particular areas of focus for SWR should include authentication, security, requirements documentation, testing documentation, and data import controls. SWR should continue to work on resolving issues that involve IT priorities and policies.
- SWR management should consider preparing special policies and providing additional training for B&E and Instream staff. All staff should be advised to read the boating and field safety policy in the *Risk Management Program Manual* prior to engaging in field work.

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**B. Detailed Observations**

1. Performance Plans and Appraisals are Up-To-Date

Two performance appraisals and new plans for employees were overdue as of the end of August 2010 due to a lack of understanding on when these were due. As of the end of September 2010, all performance plans and appraisals are up-to-date.

**Recommended Action Plan 1:** None required.

2. Experienced and Well-Educated Staff is Producing Quality Documentation

SWR has exceptionally well-qualified staff in terms of both education and experience. Both the quantity and quality of their documentation appears to be adequate, up-to-date, and continually being improved.

Each of the sixteen scientific professionals interviewed in SWR has at least a master's degree and eight of them also have a PhD. Fields of study at the master's and PhD levels include water resources planning and management, fluid mechanics, civil engineering, ecology, applied mathematics, hydrology, geoscience, environmental management, marine biology, industrial engineering, physical geography, aquatic biology, agricultural engineering, and water resources.

The sixteen SWR scientific professional staff members have a combined experience level of about 300 years with an average experience level of nearly 19 years. The minimum number of years of experience is about four years and the largest number of years of experience is about 41 years.

The experience includes research, teaching, farming, lab and mechanical work, designing electrical components, field work, consulting, engineering, hydrologic and hydrodynamic modeling, groundwater and surface water modeling, water quality modeling, water availability modeling, web page design and development, data collection and database design, data quality assurance and quality control (QA/QC), developing automated processes, scientific review/evaluation and reporting, scientific computer programming and data processing, writing instruction manuals, creating process documentation, and equipment deployment.

B&E, Instream, and WAM all have documentation regarding their processes and methodologies. SWR is having junior staff better document processes that senior staff has created in the past. They are making the documentation more easily understandable for the outside reader and better organized. Staff has created standard formats and a methodology to help organize the documentation.

All three teams have information on the agency website that describes their programs and provides data and scientific information to the public. They also have accurate and complete notes and comments for all meetings attended by staff members.

**Recommended Action Plan 2:** None required.

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3. Budgeted Funds for Monitoring and Training are Sufficient Except for Future Needs and Out-of-State Travel

SWR has a joint funding agreement with the United States Geological Survey (USGS) to perform ongoing monitoring of lake and stream gages. Cooperation with the USGS is reported to have continued since 1915. SWR also pays various cooperators to perform hydrodynamic and water quality monitoring in and around the Texas coast. Many of these contracts have been in place since TWDB began studying Texas bays and estuaries.

TWDB has kept the costs of the contract with the USGS at a stable level where TWDB is paying about \$900,000 per year despite increased costs over the last ten years. These results have been achieved because TWDB took on their own monitoring of groundwater resources in 2005 and devoted all of the money saved to lake and stream gage monitoring. In addition, over the past few years USGS has started the National Streamflow Information Program (NSIP) that is now supporting many of the stream gages that were formerly a part of the contract between TWDB and USGS.

The contracts with cooperators around the Texas coast decreased and then rose slowly from 2001 through 2007 when they again reached 2001 levels. Since 2007 they have risen in 2011 to be about 42% higher than the 2007 level. However, due to holding down costs in the USGS contract, total monitoring costs have only increased about 4% since 2007.

The funding for the USGS contract comes from general revenue. However, the funding for the contracts with the cooperators comes from the Research and Planning Fund. As a result, increases in the cost of the cooperator contracts are beginning to limit the amount of other needed research that can be requested. Also, additional cooperator monitoring is likely to become necessary as the Instream Flow Program matures and in response to SB 3 work plan recommendations.

Several SWR staff members need to attend conferences on surface water modeling every other year. These conferences are always held out-of-state in the first quarter of a biennium in odd numbered years (even numbered fiscal years). SWR has sufficient funding to pay for the conferences, but the allocation of out-of-state travel funding for these conferences may not be sufficient to allow all staff in need of training to attend. The conferences are necessary to provide SWR staff with the knowledge they require to improve their modeling techniques.

**Recommended Action Plan 3:** Management should consider how to provide for potential future needs for monitoring Texas surface water resources. This will be especially important if USGS does not continue to expand the NSIP program. Consideration should be given to funding all ongoing monitoring with general revenue funds.

The Director of SWR should work with the DEA for WSC to determine the feasibility of allocating more out-of-state travel money to SWR in even numbered fiscal years.

**Management Response 3:** *SWR Management concurs with the need to reevaluate and seek funding opportunities for monitoring activities each year. SWR staff currently anticipates a 3-4% increase in USGS monitoring costs each*

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*year and tries to build this into future budgets. SWR management will provide summaries of past and anticipated SWR monitoring costs, including changes to the NSIP program that might affect monitoring costs, by the end of April 2011 for use in developing future fiscal year budgets. Also, by the end of April 2011, SWR Management, working closely with the DEA of WSC, will prepare a memo on using general revenue to replace Research and Planning Fund funded monitoring activities.*

*SWR Management will work with the DEA for WSC and the other directors in WSC to see if funding in even numbered fiscal years can be made available for out of state travel costs in SWR. This issue will be evaluated prior to the end of April of 2011 while budgets for FY 2011 are being prepared.*

***Responsible parties:*** DEA of WSC and Director of SWR

***Estimated completion date:*** April 30, 2011

4. SB 3 Process is Complying with Legal Requirements and Staff is Providing Proper Support

SB 3 was passed by the 80<sup>th</sup> Legislature and became effective in September 2007. The law created a stakeholder driven process to determine the environmental flows required to maintain ecologically healthy streams, rivers, bays, and estuaries using existing science with input from stakeholder groups.

Groups and committees involved in the process include the Environmental Flows Advisory Group (Advisory Group), SAC, Basin and Bay Expert Science Teams (BBEST), and Basin and Bay Area Stakeholder Committees (BBASC). Board Member and Audit Committee Chairman Joe Crutcher is a member of the Advisory Group and one TWDB staff member is a non-voting member on a science team. A commissioner from both the Texas Parks and Wildlife Department (TPWD) and the Texas Commission on Environment (TCEQ) are also members of the Advisory Group.

TWDB is responsible for providing technical and administrative support requested by the various teams and committees and for controlling funds that are budgeted to support the SAC and the BBESTs. SWR has also taken on the role of trying to keep the groups on schedule according to the requirements set in the law and assuring that any potential conflicts of interest are resolved in an open and equitable manner. Because TWDB's role is advisory, SWR must remain neutral and provide scientific information and technical support.

The work for two sets of the BBASCs and BBESTs has been completed and work has begun for two more sets of BBASCs and BBESTs. After overcoming an initial learning curve with the first two groups, SWR staff is cautiously optimistic that the work of the second two groups will remain on schedule and will provide acceptable and timely results.

At least one SWR staff member attends each of the meetings and prepares comprehensive notes that are provided to other TWDB staff, management, and executive management. An update was provided to the Board members at a work session in July 2010. Meeting attendees bring back requests for technical support that is provided in an expeditious manner. SWR staff is also addressing the

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budgetary needs and has provided guidelines to prevent potential conflicts of interest with the advice and consent of executive management.

SWR staff is generally satisfied with the progress being made in the SB 3 initiative. They are also diligently working on their in-depth studies of the bays and estuaries and instream flows (SB 2). The decisions made through the SB 3 process will only take account of existing science and the process will be revisited only every 10 years. Therefore, it is extremely important to continue the bays and estuaries and SB 2 processes.

Most people involved in SB 3 acknowledge that the current level of science is not sufficient for decisions to be made, but that decisions must be made anyway. The need for continued study is apparent. SWR staff realizes that bays and estuaries and SB 2 studies must continue, but some staff members have concerns that the emphasis on these studies might diminish due to SB 3.

**Recommended Action Plan 4:** None required.

5. Additional Communication and Coordination with Information Technology (IT) Staff Is Needed

SWR staff is involved in software development, web development, modeling, and other computer related tasks. Over 50% of their work involves some type of computer related assignment. One of SWR's main computer related objectives is to collect data and transport it to TWDB. Additional computer related tasks include storing, analyzing, and disseminating the data and the analyses to TWDB staff and outside parties. In the past, SWR has used mostly flat files, but in recent years they have recognized the desirability of storing their data in databases.

The computer related duties of SWR staff were analyzed and seven projects were selected for further review. Some of the projects represented work with and for partners outside of TWDB and others involved either TWDB data or data that had to be stored for outside parties on TWDB servers. In general, the projects where outside partners are involved are going well and unresolved issues have not been reported.

Issues have mainly occurred for projects where data is stored on TWDB servers and/or where there is website development. SWR does most of their scientific modeling using Linux servers and has their own website hosted from a Linux server. They use scientific software, libraries and packages in order to be able to create and run their scientific research and to be able to work with other scientists.

SWR and IT have worked together informally for many years. In the past few years IT developed a framework for developing projects and storing data. In May 2010, executive management developed a priority list of IT projects for the agency. IT also realized the need to have uniform, secure web applications, and a common systems development life cycle that would satisfy the requirements of the Department of Information Resources (DIR) and the State Auditor's Office (SAO). The Data Center Services (DCS) contract with IBM has also affected the way IT needs to conduct business.

IT has continued to help SWR with projects even though they did not fit into the framework. However, now that the priority list has been established TWDB

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executive management needs to prioritize any IT assistance given to SWR along with other agency projects. In addition, IT has legitimate concerns about state information technology requirements including security, audit, and DCS contract requirements.

IT has considerable expertise in using their development framework. The framework includes among other things using a Windows environment with SQL Server databases and programming code written in C# in a dot net (.net) environment. SWR has expertise and most of their existing applications in a Linux environment using scientific programming languages and scripts with flat files. They have also incorporated SQL databases into some of their systems. New development must also be done on a Linux platform to take advantage of scientific packages and high performance computing capability (parallel processing) only available in this environment.

In the past, SWR has worked more informally with IT. However, current conditions necessitate that they work more formally with IT in order to be able to use the IT resources in an accountable and timely fashion.

**Recommended Action Plan 5:** The DEA of WSC should work closely with SWR management and staff to assure coordination and cooperation with IT staff is accomplished during the life cycle of computer related projects and especially in the early stages. SWR should consider what projects need to be on the priority list of IT projects and how to ensure that DIR, SAO, DCS, and other state requirements are met. Particular areas of focus for SWR should include authentication, security, requirements documentation, testing documentation, and data import controls. SWR should continue to work on resolving issues that involve IT priorities and policies.

**Management Response 5:** *The DEA of WSC and SWR Management concur with the need for better communication and cooperation with IT to clearly identify IT, DIR, SAO, DCS and other state requirements and to better communicate SWR computer-related needs to meet SWR's computational, data collection, and data dissemination missions. The Director of SWR will provide documentation to better describe ongoing SWR computer related projects to the DEA of WSC and to IT by the end of November 2010. This will help determine which projects or project components require inclusion on the IT list of projects.*

*The Director of SWR will request documentation describing IT, DIR, SAO, and DCS requirements and seek IT guidance on how to make sure that these requirements are met in all SWR projects. SWR management will schedule regular meetings between SWR staff and IT staff to ensure good communications on all SWR computer related projects.*

**Responsible parties:** *DEA of WSC and Director of SWR*

**Estimated completion date:** *November 30, 2010 and ongoing*

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6. Safety Issues Need to be Better Addressed

TWDB has an agency safety plan that is part of the comprehensive *Risk Management Program Manual* that can be found on the IWEB under Policies and Procedures. The manual has a section entitled *Boating Safety* that requires (among other things) that US Coast Guard approved vests, suits, or jackets must be worn by all occupants in rough waters, at night, or while the boat is under way.

The manual also states the DEAs, Directors, and Section Managers are responsible to promote risk management awareness through meetings and distribution of printed materials, participate in risk management and safety training, and provide such training when required. The manual also has a *Field Safety* section that is required reading for all TWDB personnel who will be involved in field work. A highlighted part of this section states: "Field personnel are responsible for establishing and implementing safety procedures appropriate for their field activities."

Both B&E and Instream must do field work to perform their functions. With few exceptions all staff in B&E and Instream could potentially be required to go to the field. Team Leads have emphasized staff taking required online boater safety courses, and nearly all staff members have spent a day at the lake training on launching boats from ramps and driving them. However, not all staff members have read the *Risk Management Program Manual*, and neither B&E nor Instream have written guidelines on safety procedures in the field.

For Instream studies, there is a need to go out on the rivers where the depth and speed of the current may be unknown. Small boats must be launched from the side of the rivers and heavy equipment deployed to take measurements. Training to launch small boats off river banks in the middle of nowhere is very different than training for launching large boats from boat ramps.

SWR does not have policies regarding who is in charge of a particular field event. A couple of incidents occurred in the field that had potentially serious consequences. One resulted in some equipment being lost overboard. In both of these incidents the fact that no one seemed to be clearly in charge seemed to play a part in the outcome.

**Recommended Action Plan 6:** SWR management should consider preparing special policies and providing additional training for B&E and Instream staff. All staff should be advised to read the boating and field safety policy in the *Risk Management Program Manual* prior to engaging in field work.

**Management Response 6:** *While most SWR staff have received boater safety and CPR training and conduct procedures safely when in the field, SWR management concurs with the need for better documentation on safety procedures and documentation showing that safety training is up-to-date, that procedures are followed, and that lines of command are clearly established for field trips.*

*The Director of SWR will develop processes to ensure that safety training is up to date and that lines of command are established for all field trips by the end of December 2010. The Director of SWR will establish procedures to ensure that all staff read the Risk Management Program Manual prior to engaging in field work by the end of December 2010. Written safety procedures will be prepared by*

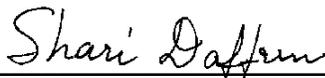
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*SWR Management for the B&E and Instream Programs by the end of December 2010.*

*Responsible parties: Director of SWR and Team Leads of B&E and Instream*

*Estimated completion date: December 31, 2010*

  
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