



APPENDIX A

THE ALCOVY RIVER WATERSHED PROTECTION PROJECT: A CASE STUDY FOR A REGIONAL APPROACH TO WATERSHED ASSESSMENT AND PROTECTION

PROJECT OVERVIEW

The Alcovy Project is one of the first comprehensive regional land use and water quality studies in Georgia. The Alcovy is a 292 square mile (~187,000 ac) watershed located east of Atlanta, Georgia within the Upper Ocmulgee Basin. The watershed spans four counties from its headwaters downstream to Jackson Lake and supplies water to surrounding areas from four drinking water intakes. In addition to serving as a reliable drinking water source for surrounding communities, the Alcovy River system and its reservoirs provide a multitude of recreational opportunities such as hiking, fishing, boating, and hunting. The Alcovy River is also home to some of the most unique alluvial swamps in the Georgia Piedmont. Land use is mostly rural and includes a mix of agricultural and forested areas. Urban areas are growing around cities situated mostly near the headwaters and watershed boundaries.

The area is anticipated to experience rapid growth in the coming decades as Atlanta continues to expand into surrounding counties. The close link between water quality and land use dictated the need for a plan that integrates vision for growth and development with water quality protection as cities and counties in the Alcovy watershed continue to grow.

Multiple regulatory requirements created the need for a watershed study that overlapped jurisdictional and political boundaries. Source water assessments and watershed protection measures are required for water supply watersheds above raw water intakes; watershed assessments are required for new and expanding wastewater discharge permits. Land areas upstream of stream segments that are not meeting their designated uses as determined by the state will be subject to pollutant loading restrictions. Individual construction sites are faced with new regulations for sediment control and runoff.

Recognizing the benefits of a regional, watershed-based approach, the four counties and 11 municipalities within the basin agreed to cooperate to fund the study (Table A-1). The project was coordinated through the Northeast Georgia Regional Development Center (RDC) with oversight from a Policy Committee and Technical Advisory Committee (TAC). Brown and Caldwell was the lead consultant and provided project oversight and coordination. Limno Tech Inc. provided modeling services, and the University of Georgia's Institute of Ecology Office of Public Service and Outreach provided policy research and technical support (Figure A-1). Financial support was provided by the Georgia EPD and each of the participating counties according to relative land area and population represented within the watershed (Figure A-2).



The project was intended to be the first step for the long-term protection of water quality and water supplies in the watershed.

Table A-1. List of Counties and Municipalities Participating in the Alcovy Watershed Protection Project

Counties	Land Area within the Alcovy River Watershed		Municipalities	Land Area within the Alcovy River Watershed	
	(acres)	(percent of total)		(acres)	(percent of total)
Gwinnett	41,777	21%	Dacula	561	0.3
			Lawrenceville	2,812	1.4
			Grayson	421	0.2
Walton	84,598	42%	Loganville	1,661	0.8
			Between	556	0.3
			Monroe	2,929	1.5
			Walnut Grove	317	0.2
			Jersey	500	0.3
			Social Circle	3,758	1.8
Newton	62,435	31%	Covington	2,123	1.0
			Mansfield	314	0.2
Jasper	11,041	6%	--	--	--

Figure A-1. Diagram of Project Management Strategy

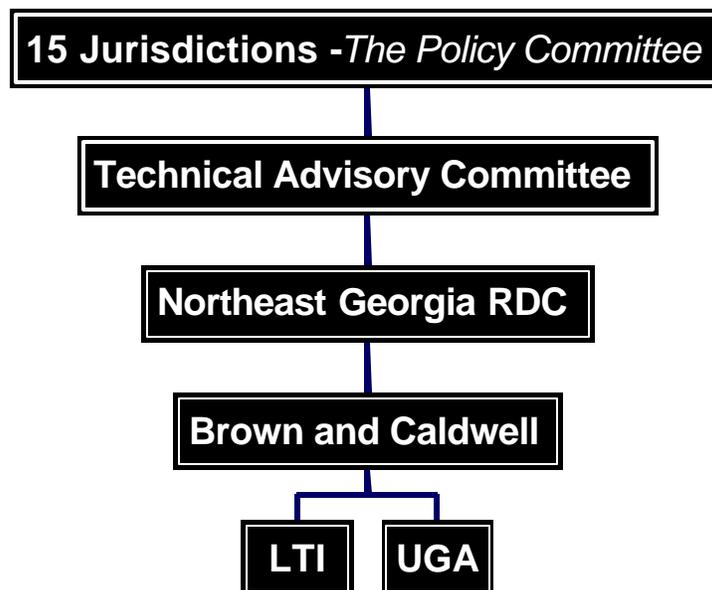
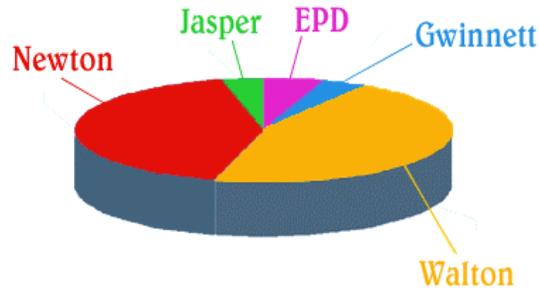




Figure A-2. Relative Contribution of Funding to the Alcovy River Watershed Protection Project



The project consisted of several complimentary components:

- A *watershed assessment* that included data collection, hydrologic and water quality monitoring, and development of a watershed model
- Four *source water assessments*, prepared in accordance with Georgia’s Source Water Assessment and Protection Implementation Plan (SWAPP) for Public Drinking Water Sources
- A *watershed protection plan*, which included recommendations for new or improved local ordinances, best management practices, and continued regional cooperation and public involvement

All cities and counties participated in the development of the watershed protection plan. However, Gwinnett County had previously conducted a separate watershed assessment, prepared a protection plan, and was already underway with implementing various components of their plan as the Alcovy project was ending. Coordination with the Gwinnett work was a challenge throughout the Alcovy project and demonstrates the difficulty with conducting such projects within the confines of political, rather than watershed boundaries.



DEVELOPING A COOPERATIVE APPROACH

This section presents the timeline of events, participants, and discussions leading up to the inception of the Alcovy Watershed Protection Project. This project provides one example of how to develop a cooperative approach across political jurisdictions and multiple regulatory agencies for undertaking a regional watershed assessment and creating a comprehensive watershed protection plan.

Bringing People Together

On March 27, 1998, a meeting was hosted by the Georgia Department of Community Affairs (DCA) and the Georgia Environmental Protection Division (EPD) in Gwinnett County to open discussions of the possibility of a basin-wide study of water quality protection for the Alcovy River watershed. The immediate focus of this meeting was the protection of the water supply watershed above the Monroe surface water intake, parts of which lie in Gwinnett and Walton Counties, and the cities of Dacula, Lawrenceville, Grayson, and Between. Some of the governments represented had been issued deadlines by DCA to implement watershed protection measures for this particular watershed, while others had not yet received such notifications. The meeting's purpose was to explore the possibility of working together on developing a joint watershed protection plan as an alternative to the watershed minimum guidelines (Part V Criteria of the Georgia Planning Act), following the example of the Big Haynes Creek planning effort.

The idea met with positive response, with representatives of Newton County, the City of Covington, Jasper County, and the Walton County Water and Sewerage Authority suggesting that the scope of the effort should include the whole Alcovy Watershed as far downstream as Jackson Lake. The consensus of the meeting was that:

- A basin-wide study should be explored
- The Northeast Georgia Regional Development Center would take the lead in facilitating the activity with the cooperation of the Atlanta Regional Commission
- EPD and DCA would attend future meetings and provide technical assistance

A second meeting was held in Monroe, Georgia, on May 11. The meeting resulted in deciding the following:

- The scope would be limited to direct examination of watersheds within the Alcovy Watershed, although some attention would be paid to other contributors to water quality of Jackson Lake



- Ongoing efforts by Gwinnett County would be coordinated with new studies
- The general structure followed by the Big Haynes group of having a technical committee and a policy committee would be appropriate
- EPD would have to answer questions about how all the different water quality programs fit together
- A smaller ad hoc committee would be formed to develop a plan of action for initiating the project

The ad hoc committee¹ met several times with representatives of EPD and DCA over the next few months, including a meeting with Commissioner Harold Reheis. The Environmental Protection Division operates multiple programs relating to non-point source water quality and local governments. The Department of Community Affairs administers the environmental planning criteria specified by the Georgia Planning Act. Each program could have different requirements, and the group sought assurance that a plan that satisfied one or some of these programs would not have to be re-done or supplemented with additional work later to satisfy different criteria for another program. The EPD agreed to coordinate its programs with the Alcovy work so that the resulting plan would indeed satisfy all water quality requirements.

In addition, the group wanted to know if a plan could be approved if one or a few jurisdictions failed to participate or to implement it. It was learned that EPD considers basin-wide cooperative planning to be so valuable that “gaps” in their coverage need not make the plan non-viable. Furthermore, EPD will use its permitting and enforcement powers to encourage implementation of a plan once it is adopted. EPD offered to make every effort to encourage cooperation by each government in the basin.

The Department of Community Affairs agreed to suspend the watershed protection deadlines pending development of a schedule and scope of work for an alternative to the environmental planning criteria. If the governments agreed to a reasonable planning schedule, DCA would incorporate them into its requirements for compliance. If no planning schedule was agreed upon, DCA would then reevaluate a deadline for Part V Criteria for affected governments.

¹ The committee comprised two representatives from each county: Steve Logan & Frank Stephens, Gwinnett; Frank Sherrill & Mark Ennis, Walton; Tom McLean & Glen Kell, Jasper; John Byce & David Croom, Newton. They were assisted by staff from the Northeast Georgia Regional Development Center, the Atlanta Regional Commission, EPD, DCA, and the Soil and Water Conservation Districts.



Obstacles to Getting Starting

The major obstacle to creating a cooperative regional watershed study for the Alcovy project was funding. The cost for conducting a comprehensive watershed study to address multiple regulatory requirements across four counties was significant. Since regulatory requirements for watershed protection were largely unclear at the time and issues such as source water protection and TMDLs were just beginning to emerge, some jurisdictions needed additional justification for conducting such a study. The ultimate incentive for agreeing to fund this study came from the desire from those counties and municipalities downstream to have a voice in protecting water quality from potential upstream threats.

Developing a Plan of Action

The planning group proceeded to draft a schedule of activities for both the technical and policy processes for local governments. The committee drafted a cost allocation method based on land area within the basin (50%) and population (50%). For jurisdictions receiving water from the Alcovy River or its tributaries, all of the population was used; for jurisdictions not receiving water, the estimated population within the watershed boundaries was used. At the time, Gwinnett County was in the midst of a multi-million dollar water quality assessment study and planning effort for the entire county. It was the opinion of the planning group that the portion of work necessary for the Alcovy Watershed Study in Gwinnett County was already being done. Therefore, the group estimates that roughly \$260,000 was being spent by Gwinnett County toward the protection of the Alcovy. In the cost allocation formula, therefore, Gwinnett County was assigned a relatively small amount, as its share of work was not duplicated by the ongoing effort. The committee also drafted a memorandum of agreement to submit to local governments for adoption by resolution committing their support for the planning process.

A meeting of representatives from each potentially participating jurisdiction was held on November 6, 1998 in Newton County. The group affirmed the cost allocation method, the schedule of activities, and the text of the Memorandum of Understanding (MOA). The existing planning group was “rolled over” as the Technical Advisory Committee. The representatives of the various jurisdictions present, plus the chief elected officers of un-represented governments, were named as the Policy Committee.

After informal consultation with consultants experienced in water quality assessment projects, an estimated budget of \$1,000,000 was established, the cost allocation method applied, and the budget, a rough scope of work, proposed organization, and the Memorandum of Understanding were sent to each potentially participating government.



The MOA was signed and returned by all four counties and six of the 10 cities. Despite not having a preliminary agreement with a few of the smaller cities, the advisory group decided to move ahead. The funding was allocated to counties, which could, at their discretion, approach participating cities to share the cost. Invoices were prepared and submitted to the four counties. Meanwhile, the process of selecting a consulting firm was begun.

Selection of a Consulting Firm

The technical committee drew up a request for proposals to conduct watershed assessments, which was published in November 1998. Eight firms responded, and the technical committee chose four firms to prepare detailed proposals and make presentations to the committee. The presentations were heard on April 21, 1999, and the firm of Brown and Caldwell, in association with LimnoTech, Inc. and the University of Georgia's Institute of Ecology Office of Public Service and Outreach, was chosen as the lead firm. Negotiations with Brown and Caldwell to detail the scope of work and budget were successful. This method of selecting a consultant was chosen for four reasons.

- First, the watershed approach involving multiple jurisdictions and designed to address multiple regulatory as well as local needs was, if not unique, unusual enough that the TAC did not believe they could write a detailed scope of work and simply ask for qualifications and bids
- Second, the TAC felt that they had a sufficient grasp of the needs of the study to issue a request for proposals
- Third, the TAC felt that selection of the right firm for the project would depend heavily on the approach that the firm took and not merely on their general qualifications
- Fourth, the TAC felt that preparation of a proposal for such a large and unusual project would be a significant undertaking in itself, as would proposal review by the TAC. Therefore, they did not wish to require unnecessary work for either the applicants or TAC reviewers
- The final cost for the study was not to exceed \$900,000. The technical committee adopted a project budget of \$1,000,000 to be spread over two fiscal years according to estimated rates of incurring costs. In May, 1999, the Northeast Georgia Regional Development Center issued requests for payment to each of the four participating counties for anticipated expenses covering the period June 1999 through June 2000



DEVELOPING LONG-TERM GOALS

The Alcovy River Watershed Protection Project was the first comprehensive water quality study of the Alcovy River. The project included goal setting, data collection, field sampling, water quality modeling, plan development, and public participation. The goals, established at the start of the project, were developed to address watershed assessment requirements, source water assessment and protection, and broader watershed protection for long-term sustainability of water supplies and water quality throughout the watershed. Goals for the project included:

- Protect water quality throughout the watershed
- Develop and implement an economical, basin-wide approach for water quality protection with flexibility for individual jurisdictions
- Provide local governments with tools to facilitate the decision-making process on planning and management issues related to water quality
- Clearly define implementable strategies that meet or exceed state requirements for long-term watershed protection, including:
 - Source Water Assessment Plans (SWAPs) for protection of water supplies throughout the basin
 - Watershed Assessments for increased future wastewater discharges
 - Environmental Planning Criteria
 - Effective measures for Erosion and Sedimentation Control (E&SC)
 - Improved Stormwater Management
 - Implementation of TMDLs (total maximum daily loads)
- Preserve the unique ecology of the Alcovy watershed and help protect Lake Jackson from further degradation
- Provide a working water quality model and long-term monitoring plan
- Foster informed public opinion about the challenges and opportunities for water quality protection in the Alcovy watershed
- Involve the public in watershed protection planning and implementation
- Work with existing organizations and programs to create the foundation for an on-going program of watershed protection



PUBLIC PARTICIPATION PROCESS

Public outreach and participation was a key component of the Alcovy Project. Communication and education about the watershed study increased the knowledge among local residents regarding watershed protection efforts, generated input on proposed policy tools and implementation options, and presented opportunities for on-going partnerships between community groups in the assessment area and participating government agencies and utilities. Input was received from over 500 people, including multiple stakeholders throughout the Alcovy River Watershed. The sections that follow describe components of the public participation process.

Forming Advisory Committees

Local jurisdictions provided support to the Alcovy Project through multiple advisory roles (Figure A-1). The Policy Committee, which consists of elected and appointed officials, guided policy elements of the project and acted as a voice for local constituents. Additionally, two individuals were selected from each county to serve on the Technical Advisory Committee (TAC). The TAC met with the consultant team on a monthly basis to oversee technical aspects of the project and to communicate project progress to county officials. The Northeast Georgia Regional Development Center (RDC) facilitated the Alcovy Watershed Assessment Protection Project process by:

- providing a forum for city and county jurisdictions to collaborate
- helping communities understand regulatory requirements
- providing data and guidance for modelers and watershed scientists

Developing a Public Involvement Plan

The Public Involvement Plan for the Alcovy Watershed Protection Project was designed to serve as a bridge between project needs and community concerns. Working from the vision expressed by the Northeast Georgia RDC and the TAC, the approach was crafted and formalized in a comprehensive Public Involvement Plan. The Plan incorporated research on attitudes and opinions of key opinion leaders, and a review of media coverage on relevant issues, in order to lay the foundation for an effective program. Goals, as developed by the NEGRDC and the TAC, were as follows:



- Employ an easy-to-understand format to foster informed public opinion about the importance of water quality in the Alcovy
- Seek to understand the values and attitudes of stakeholders
- Provide opportunities for meaningful input and feedback on recommended solutions
- Create a foundation for ongoing programs supporting citizen involvement in Alcovy water protection
- Design and employ a basin-wide approach with flexibility for individual jurisdictions
- Incorporate public input into the Approved Management Plan, and encourage broad-based support for Plan implementation

The overriding message throughout the public involvement phases of the Alcovy Watershed Protection Project emphasized the protection of the river and its tributaries as a valuable natural resource and the regional approach necessary for long-term protection. All of the jurisdictions and agencies within the four counties participating in the project acknowledged the need to work in concert, and committed to developing a comprehensive plan to protect water supplies, water quality, and the unique ecology of the Alcovy River system.

Local residents were brought onto the team to extend these protection efforts beyond regulatory requirements. The message, reflecting this cooperative effort, was: ***TEAM ALCOVY: NEIGHBORS FOR CLEAN WATER.*** The fundamental concepts woven into the message were:

- A cooperative spirit among neighboring jurisdictions and agencies ensure a regional effort to water protection
- We all have an impact on the Alcovy's quality, and we can all be part of preserving it
- Protection strategies uniquely suited to each community help all communities protect this precious shared resource

Mechanisms for engaging stakeholders were discussed prior to implementation of the Public Involvement Plan. The resulting Plan employed a comprehensive approach to encourage the public to participate in developing a watershed protection program that could be successfully implemented for the Alcovy River. As the project moved forward, this Plan evolved and reflected the direction necessary to ensure the process was on track. Discussed below are the components of the Plan.

Stakeholder Interviews. A list of stakeholders was developed based on input from the NEGRDC staff, the TAC, participating governments, and other relevant sources. Stakeholders



are those members of the community having significant involvement or interest in the watershed study project. From this list, 15 of the identified stakeholders were selected by the TAC to be contacted for an informal interview. The goal of the interviews was to garner suggestions on how to best engage the public in the process, and to solicit input on groups that should be contacted for scheduling of informational presentations and input sessions about the project. The

stakeholders participating in the interviews represented a variety of backgrounds and interests, including developers, farmers, planners, environmentalists, academics, concerned citizens, etc. These individuals provided valuable information about concerns of interest to particular communities and jurisdictions, as well as guidance on how to reach interested residents within the watershed. Interview summaries were provided to the TAC for consideration in the planning process.

Public Meetings. The BC team conducted three public meetings during the course of the Alcovy Watershed Protection Project. Announcements about these meetings were placed in the form of paid advertisements in the major newspapers within each jurisdiction. In addition, notices were mailed to the stakeholder list and were posted on the project website. The first public meeting was conducted shortly after project startup to provide an overview of the study and address any initial concerns from the public. The second was held at the project midpoint to provide more in-depth findings from the study, and solicit specific responses to proposed policy tools such as conservation subdivisions, increased enforcement, etc. The third was conducted near the conclusion of the study after sampling and data results had been analyzed, requesting comments and additional feedback. All three meetings were reasonably well attended, and residents took advantage of the opportunity to provide their specific concerns and issues, as well as ask questions related to their particular interests.

These meetings were open to the general public and featured an open house format. Manned information stations provided specific information on implementation options for watershed protection and provided an opportunity for one-on-one discussions with the public about these and other issues. Presentations and subsequent discussions were also part of the meeting format and provided a means to relay project information and results and to solicit other comments and questions. These meetings served as a complement to the next component of the Public Involvement program, Community Presentations.

Community Presentations. The Brown and Caldwell team conducted more than 15 community presentations throughout the course of the project. Community groups included local rotary and garden clubs, cattleman's associations, and many others. These meetings were scheduled by contacting various community groups identified through the stakeholder interview process, and from recommendations of the TAC. Following guidance from the TAC and the Policy Committee, policy concepts relevant to the recommendations of the watershed protection plan were introduced to identify and address the specific needs of each community. Presentations typically consisted of a 15-minute slide show presentation, followed by a question/discussion



period, and in some cases, including a written survey asking for responses to questions related to the challenges and opportunities for long-term watershed protection and preferences of various implementation options.

Newsletter Articles/Press Releases. The BC team developed and distributed press releases to be included in community newsletters and local newspapers. Articles focused on project overviews, project updates, data results, computer modeling, and potential implementation strategies. Press releases were also forwarded to all major media in the watershed study area throughout the duration of the project detailing project milestones and announcing all public meetings.

Web Site. The BC team developed a publicly accessible web site providing project-related information (www.teamalcovy.com). The web site was a valuable tool in providing timely information to the public. It included information about upcoming community presentations, public meetings, and other news of interest. The site also included an extensive sampling data section which provided scientific sampling data for all of the river sampling sites, as well as easy to understand explanations for the findings.

Reaching Elected Officials. A policy committee was formed at the beginning of the project to act as a general steering committee for the project. This committee was composed of elected officials and other representatives from each participating jurisdiction. Meetings were held to identify issues of concern and at the end to gather input on recommendations. Presentations were also given to various planning commissions and regular commission meetings at intermediate stages of the project.

MODEL SELECTION

Watershed modeling was an integral portion of the Alcovy Watershed Protection Project. The overall goal of the watershed modeling was to develop a tool that can define acceptable land use and/or best management practices that will result in attainment of water quality objectives. This tool must meet the needs of both the TAC and the Georgia DNR/EPD. The project team interviewed the TAC to better define their management objectives for the modeling. The following sections detail the factors that were considered for model selection.

Model Objectives



The Project Team interviewed the TAC regarding many factors that can influence model selection including:

- Consistency with other local applications
- Stakeholder approval
- User interface
- Groundwater quality

- Model constituents
- Spatial and temporal resolution
- Reliability

Consistency With Other Local Applications

How important is it to select the same watershed modeling approach that is being applied in the majority of adjacent watersheds? The TAC believed that consistency was very important. The Northeast Georgia RDC is not currently running models for other watersheds. There is agreement within the TAC that the Northeast Georgia RDC will be the entity that runs the model. The Northeast RDC will also be responsible for maintaining the model when the project is complete. There is a desire to have some consistency across the models supported by the RDC. However, recognizing that different watersheds will have different resources available, the RDC also needs the flexibility to support a range of model complexities (including limited or no modeling). There is some desire to have consistency with the model application already developed for the Gwinnett County portion of the watershed, but this should not be viewed as the primary determinant of model selection.

Stakeholder Approval

What stakeholders will be required to approve the selected model? The TAC made the final selection of the model with input from EPD, based upon recommendations from the project team. Input for model selection was not solicited from others.

User Interface

How important is it that the selected model contain a user-friendly interface that will allow the TAC to evaluate additional scenarios without consultant assistance after project completion? A user-friendly interface (with user friendly inputs and outputs) that allows the TAC to perform additional scenarios without consultant assistance after project completion is an important model feature.



Groundwater Quality

Is the capability to simulate changes in groundwater quality important? The capability of the model to simulate changes in groundwater quality is not an important enough model feature to invest additional resources in its development for the Alcovy project.

Model Constituents

What are the water quality constituents of concern? At a minimum, the model must be capable of predicting the concentration of those constituents that have been listed as impairing water quality in the watershed. The model should also be able to provide predictions for other parameters that are of concern to the TAC such as metals, nutrients, and sediment.

Spatial and Temporal Resolution

What is the required spatial detail of model predictions and what are the required time scales? For the river, a one-dimensional (1-D) model that can make predictions on the scale of hundreds of feet was sufficient for this study. A 1-D model will predict changes in concentration along the length of the river, but will not consider lateral or vertical variations in water quality. For the reservoirs (Beaverdam Creek and Cornish Creek Reservoirs), an empirical model that assumes complete mixing was sufficient. Only the Alcovy arm of Jackson Lake was simulated. Continuous simulation with a daily time step was used to estimate watershed loads.

Reliability

How reliable should the model be? The TAC expressed a desire to focus on the model with the greatest long-term accuracy as opposed to the model that provides the most "bang for the buck" at the end of the study.

Model Comparisons

This section describes the ability of two models to meet the objectives stated above. Although only two models are presented, it is important to know that the models were selected from the suite of models reviewed in the EPA Compendium of Watershed-Scale Models for TMDL Development (EPA, 1997). Model selection was based on prior experience with these models, performance of these models, their ability to meet the model objectives outlined in this memorandum, and their acceptability to EPD.



GWLF – Generalized Watershed Loading Functions. GWLF is a model with a moderate level of complexity which has been approved by EPD and which performed well when compared to measured data. A modified version of GWLF has been used previously in the Lake Lanier watershed and is currently being used within Cherokee County, Georgia.

GWLF is capable of meeting a majority of the objectives described above, and will provide as much or better accuracy than BASINS/NPSM if applied only with the data to be collected during this study. It can be applied using a level of effort less than currently allotted in the existing budget. Its primary limitation is that its level of accuracy cannot be greatly improved in response to additional future monitoring, giving it a lower potential future accuracy than the more complex BASINS/NPSM model.

BASINS/NPSM - Better Assessment Science Integrating Point and Nonpoint Sources/ Nonpoint Source Model. BASINS/NPSM was developed by the EPA specifically to address multiple land use effects on water quality including both point and nonpoint sources of pollution. BASINS/NPSM is a model with a high level of complexity, based upon the well-accepted Hydrologic Simulation Program – Fortran (HSPF) watershed model. BASINS/NPSM is currently being used within Georgia (i.e. Fulton County, Gwinnett County and elsewhere). This model has been approved by EPD and has also performed well when applied with sufficient monitoring data. It is capable of distinguishing between sediment that is washed off from land surfaces and that which is re-suspended within a given channel reach, thus partitioning sediment loadings accordingly.

BASINS/NPSM is also capable of meeting a majority of the objectives described above. The strongest factor favoring the use of BASINS/NPSM is the potential for future accuracy much greater than the GWLF model. This improved accuracy can be achieved only in response to a long term (i.e., at least six years) monitoring effort and additional calibration effort. It must be recognized that BASINS/NPSM contains more complexity than can be supported by the existing monitoring effort. If the resources are not available to support this long-term effort, BASIN/NPSM will provide accuracy similar to or slightly less than GWLF at a higher overall cost (although still consistent with the model budget).

Model Recommendations

Management objectives outlined by the TAC were used to guide the model selection process. These objectives included selection of a model which:



- is consistent with other applications in Georgia
- contains a user-friendly interface
- is approved by the Georgia EPD
- has the ability to simulate constituents of concern on a continuous basis
- and has the greatest long-term accuracy

Two models, BASINS and the LTI-modified version of GWLF, were identified as being capable of meeting the majority of the management objectives outlined by the TAC. GWLF was believed to provide the higher reliability for this phase of the study, as it has fewer data needs and thus was more consistent with the amount of data available during the time of the study.

However, BASINS/HSPF was selected primarily because it provides the potential for the greatest long-term accuracy. It was recognized that this model contains more complexity than can be adequately supported by the existing monitoring effort. The full benefits of the model will be achieved only after at least six years of additional data are collected and the model calibrated accordingly.

THE ALCOVY RIVER WATERSHED ASSESSMENT

The assessment of existing conditions included historical data collection, base flow and wet weather field sampling, biological field data collection and habitat assessment. Water quality and flow data were collected to characterize existing conditions in the Alcovy River watershed and to provide initial data for model calibration. Monitoring data supplemented existing water quality and flow data in the watershed and were used to develop a watershed-specific model that could be used as a tool for future land use planning decisions.

The approach for water quality monitoring for the Alcovy watershed included:

- Gathering existing water quality and flow data in the basin
- Evaluation of the watershed for additional data needs
- Identification of sites for additional field data collection
- Collection of additional hydrologic and physical, chemical and biological water quality data



Collection Of Existing Data

Data collection involved assimilation of existing water quality data, reports and other investigations, as well as implementation of a water quality monitoring plan. Existing sources of data included:

- USGS Gaging Station Data
- Water Treatment Plant Data
- Loganville Water Reclamation Facility (WRF) Data
- EPD Water Quality Investigation of Big Flat Creek

- EPD Jackson Lake Study
- The Gwinnett Watershed Assessment
- Land use

Site Selection for Water Quality and Flow Monitoring

For the Alcovy project, sites were selected throughout the watershed for measurements of streamflow, collection of water samples for chemical analysis, and assessment of aquatic biological community and habitat conditions. Objectives of monitoring included:

- To define pollutant loads and flows for sub-basins draining various land uses
- To monitor water quality in streams not meeting designated uses
- To check existing monitoring sites
- To determine water quality in water supply watersheds
- To conduct a longitudinal analysis of water quality in the river

Fifteen sites were identified for water quality and hydrologic monitoring. Flow data and water quality samples were collected during both baseflow and stormflow conditions to capture stream response and identify the variable concentrations of water quality constituents. A subset of sites was selected for biological monitoring, including macroinvertebrate and fish collections and habitat assessments. A reference versus study site approach was necessary for biological assessments, and therefore two additional sites were selected outside the study area for this



purpose. Representatives of the Fisheries Section of Georgia's Wildlife Resources Division were consulted regarding reference site selection and recommended two sites, one to represent smaller streams, the other to represent sites located on the main stem of the river.

Flow Monitoring

Flow monitoring was conducted to provide site-specific hydrologic data for model calibration. Stream velocity and channel measurements were made during baseflow (dry weather) and stormflow (wet weather) conditions. Storm flow events were defined as any rainfall event of more than 0.10 inches in a two-hour period or more than 0.25 inches in a twelve-hour period that caused the stream to rise at least three tenths of a foot. In addition, the sampling plan required that total rainfall in the 72-hours prior to a storm not exceed a total of 0.10 inches. Manual flow monitoring was conducted. Therefore, only instantaneous stage and velocity were obtained for each site for a given site visit. Utilization of automated flow monitoring equipment was tested in

the field. Unfortunately, it was not feasible due to problems with maintenance and sediment clogging. Staff gauges were installed at all sites to monitor the stream/river surface water levels during sampling visits. A channel cross-section location was also established at each monitoring station to serve as the permanent location for flow monitoring through the study.

Water Quality

Water quality data was compiled from existing sources and was collected from the 15 monitoring sites located throughout the watershed. Biological assessments were conducted at selected sites. Field data collection for the Alcovy Watershed Assessment coincided with one of the driest periods on record.

For the level of development in the Alcovy Watershed, the river condition is typical. It is not as good as in a heavily forested watershed, but better than a highly urbanized watershed. When graded against the three levels of concern for evaluating river systems, the Alcovy rates as follows:

- **Public Health:** For the normal level of human contact, the river poses very little threat to public health. Following rainfall events in certain places in the watershed, fecal coliform levels are elevated.
- **Cost of treating to drinking water standards:** Currently, the water quality in the Alcovy River is considered a very good drinking water source. As discussed further in the Source Water Assessment Reports, there are various risks upstream of water intakes that require management by the local water treatment officials. Continued protection of the river will control water treatment costs and minimize potential risks.



- **Water quality for aquatic life:** Degradation of habitat has resulted from sediment deposition.

The primary threat to stream health in the Alcovy is sediment. Fresh inputs of sediment to streams from land disturbing activities coupled with eroding streambanks contribute to elevated sediment loadings throughout the watershed. Fine sediments become suspended during stormflow increasing stream turbidity. These effects are most pronounced immediately downstream of urban areas (in the headwater streams in Gwinnett County and below Monroe) and in streams that were historically channelized. Ammonia toxicity continues to be a problem downstream of Loganville's wastewater discharge on Big Flat Creek. Assessment data confirmed its continued 303(d) listing for impairment until plant improvements, which are underway, are brought on line. Data also substantiated the fecal coliform impairments on other 303(d) segments in Gwinnett County.

Phosphorus levels were sporadically elevated across a number of sites. Elevated levels were reported during stormflow and were likely associated with sediment suspended in the water column. Fecal coliform was elevated across sites, particularly during wet weather. Concentrations at Mountain Creek below Monroe were also high during dry weather, indicating a potential source directly upstream.

Water quality data collected at the Cornish Creek Water Treatment Plant found phosphorus concentrations were in the range typically identified for mesotrophic (moderately nourished) lakes. Nitrogen levels were generally low and did not appear to pose a threat to the water quality of the lake, since phosphorus is the limiting nutrient for eutrophication. Chlorophyll *a* data was somewhat limited. However, concentrations measured during 1996 and 1997 ranged from mesotrophic to hypereutrophic conditions. This means that the lake is over-nourished, impacted by sedimentation, and that algae/macrophyte growth is periodically high (as was observed in 1997). Such conditions are stressful to fish and are not conducive to supporting more sensitive species.

Jackson Lake is monitored by EPD for compliance with water quality standards. Average phosphorus concentrations are indicative of mesotrophic to eutrophic conditions. Fecal coliform levels are generally low. Chlorophyll *a* concentrations exceeded the state standard of 20 ug/L for 1989 and 1999, and are close to exceeding the standard for the current year 2000. A Phase I Clean Lakes Diagnostic/Feasibility Study by Georgia EPD in 1993 found that sediment deposition was occurring at a rate of 550 tons per square mile per year (1,660 lbs/ac/yr), and that the reservoir had lost approximately 40% of its storage capacity from 1910 to 1989. Sediment loads were highest from the Yellow and South Rivers and were interfering with recreational uses of the lake.



Aquatic Biota

The abundance, diversity and sensitivity of aquatic macroinvertebrates and fish were gauged against nearby reference streams. Most Alcovy sites scored in the "poor" to "very poor" range. Alcovy at Newton Factory Mill Road scored the highest for macroinvertebrates and Cornish Creek had the best rating for fish. Some sites had better fish than macroinvertebrate scores, and others vice versa. Big Flat Creek below Loganville (AR-13) clearly emerged as the most impaired site due primarily to ammonia toxicity. Habitat and biological degradation at other sites was attributable to sedimentation.

Channel Conditions

Similar to most Piedmont river systems, the primary cause of degraded stream conditions in the Alcovy is sediment. The river and its tributaries are already severely impacted by sediment that originates both from the channel itself and from land disturbing activities in the watershed.

Following the era of intense row-crop agriculture, streams became choked with sediment and unstable channels began to erode, leaving exposed banks and significant sediment deposits in downstream reaches. Stream channels in the Alcovy continue to erode today. Erosion is most pronounced in streams draining urban areas and in those reaches that were previously channelized.

Sediment was the primary reason for degraded aquatic habitat conditions and the absence of sensitive macroinvertebrate and fish species at most Alcovy biological monitoring sites. Impairment was due mostly to large and widespread deposits of sediment in the observed study channel reaches, and less from riparian vegetation degradation. Bank stability scored low at the smaller Alcovy sites, indicating that bank sediments in these reaches could contribute to downstream sediment loadings. The exception was the most downstream site at Newton Factory Mill Road just upstream of Lake Jackson. The stream gradient is higher in this reach of the river, thus creating conditions favorable for aquatic life (rock outcrops and riffles). Sediment deposition also decreases longitudinal stream gradient and creates conditions favorable for beaver, which in turn affects stream hydrology. Stream reaches such as Cornish Creek at Lower Jersey Road and Beaverdam Creek at Stock Gap Road that were once channelized are inhabited by beaver today. Beaver dams create sluggish flow conditions uncharacteristic of Piedmont streams.

This assessment of channel conditions shows that historical land use practices have had a significant influence on stream geomorphology, which, in turn, significantly affects water quality and aquatic habitat. Urbanization can contribute additional sediment loadings to streams and accelerate channel erosion through increased runoff from paved surfaces. These combined effects further degrade channel and water quality conditions. The primary control mechanisms to offset these effects are improved stormwater management for downstream channel and water quality protection and minimization of sediment delivery to streams.



Evaluation of Watershed Protection Measures

This section describes the procedures used to evaluate various watershed protection measures. Modeling scenarios were developed to test individual water quality improvement policies. The purpose of modeling these scenarios individually is to provide the TAC and elected officials with the best information possible on the potential effect selected policies and land management alternatives may have on selected water quality parameters in the Alcovy Basin. This will facilitate a more informed level of decision making than is generally available to local governments faced with potential water quality problems.

Model scenarios are summarized in Table A-2. The fundamental model input for each of the future scenarios will be the version of the projected land cover for the year 2020. This coverage was generated using county comprehensive management plans and was altered according to changes agreed upon by the TAC and planners in each county. This land cover remained

essentially constant for each trial run to determine the effect of potential policy changes. In some cases, policies are tested by making slight changes to this land cover. In other cases, a pollution reduction factor is applied to individual land cover types. Details of each model scenario, including the assumptions that were made for each, are given in the *Alcovy River Watershed Assessment*.

There are also a number of policies which do not readily lend themselves to analysis through modeling but which nevertheless could be very important for protecting water quality. For example, the explicit effect of a public education program cannot be realistically modeled. Furthermore, practical constraints limit the number of alternative scenarios that we can examine using BASINS. Therefore, scenarios were selected that will yield the most useful information. However, the local jurisdictions and the Northeast Georgia RDC will have the capacity for an unlimited number of additional model runs after the project is completed, if more information is needed.



Table A-2. Model Scenario Descriptions

Model Scenario	Model Objective	Area Modeled	Land Cover	Specific Data Needs/Input
1	To determine current water quality under present land use ordinances	Alcovy Watershed	Existing (1999)	Satellite imagery of existing land cover
2	To determine default future water quality under existing land use ordinances + Part V Criteria, as written	Alcovy Watershed	Future (2020)	Future land use cover for each county
3a	To determine future water quality with conservation subdivisions	Alcovy Watershed	Future (2020)	Percent impervious surface reductions for conservation subdivisions
3b	To determine future water quality with riparian buffer ordinances	Alcovy Watershed	Future (2020)	Pollutant removal efficiencies for rip. buffers
3c	To determine future water quality with impervious surface restrictions	Alcovy Watershed	Future (2020)	Pollutant removal efficiencies for imp. surfs
3d	To determine future water quality with stormwater infiltration	Alcovy Watershed	Future (2020)	Pollutant removal efficiencies for infiltration
3e	To determine future water quality with improved enforcement of erosion and sedimentation laws	Alcovy Watershed	Future (2020)	# ac/yr under construction Pollutant loading reductions
3f	To determine future water quality using some combination of 3a-3e	Alcovy Watershed	Future (2020)	Same as selected scenarios
3g	To determine future water quality using some combination of 3a-3e	Alcovy Watershed	Future (2020)	Same as selected scenarios
4	To determine water quality of alternative 2020 futures: planned (default future for Newton + new for Walton) vs sprawl (default future for Walton + new for Newton)	Cornish Creek Sub-basin	Alternative 2020 Futures	



Constituents selected for Alcovy River modeling include flow, sediment, phosphorus, fecal coliform and metals. Data were collected that allowed for model calibration for each parameter, with the exception of metals. Results were in the form of pollutant loadings at the downstream end of each of the watershed sub-basins. Results are compared to loadings under the present and the “default” future in which only the state-required minimum policies are implemented.

As with any modeling approach, there are limitations and assumptions. These are described in further detail in the *Alcovy River Watershed Assessment*. The outcome of the scenario modeling should be viewed as just one factor in selecting policies that are best for the future of the Alcovy River Watershed. Other factors such as cost, public opinion, and other benefits not measurable by BASINS (such as the important habitat benefits of riparian buffers) should be considered as well.

Model Results

BASINS was applied to the Alcovy River watershed, using site-specific data on features such as climate, land cover and hydrology. These data were supplemented with water quality and flow data collected at multiple locations throughout the watershed. The watershed model was calibrated for current conditions using the water quality and flow data. The calibrated model was then used to assess the water quality impacts of various future land use scenarios within the Alcovy basin.

Under projected future (2020) land use conditions with no additional controls, sediment loads are projected to increase by 137% and 152% over current loads above Jackson Lake and near the Walton/Newton line, respectively. The increase in loads is attributed to the projected increase in development. Similar trends were observed for other model parameters (Total Phosphorus and fecal coliform). The execution of each individual implementation option was minimally effective in reducing future pollutant loads. Model results indicated that an improved stormwater management ordinance (designed for downstream channel and water quality protection) offered the highest degree of water quality protection. Such measures would reduce total suspended solids in surface water by 28%, Total Phosphorus by 28%, and fecal coliform by 46%. This reduction was greater than the combined reduction from all other modeled policy tools. In each scenario, pollutant loads are expected to increase significantly above current loading, even with the implementation of Best Management Practices (BMPs).



Developing a Watershed Protection Plan

The Alcovy Watershed Protection and Implementation Plan was developed to provide a framework for implementation of water quality protection policies, incentive tools, and other protection measures. Some areas of the Alcovy watershed have grown rapidly in recent years and others are projected to continue to develop at an accelerated pace.

The assessment portion of the Alcovy Watershed Protection Project predicted that the major threat to water quality over the course of the next 20 years would be urbanization. Accordingly, most recommendations presented in the *Alcovy River Watershed Protection Plan* were concerned with managing growth to minimize its impact on water quality. The purpose was not to discourage development, but to ensure that the development that does occur minimizes any adverse affects to water supplies and stream health.

Most of the plan recommendations were in the form of ordinances or policies to be implemented by the local governments within the watershed (non-structural). Other recommendations included watershed protection measures that may be achieved on an administrative level or through partnership or cooperative agreements (includes both structural and non-structural). Many incentive-based and other implementation tools were recommended for all counties. However, not all policy tools were recommended for all jurisdictions. Because problems were both complex and variable across the region, it was determined that a cookie-cutter approach that emphasizes a few simple solutions would not meet this goal. Recommendations were tailored to each county jurisdiction, with plans to incorporate specific recommendations for cities as part of the long-term implementation of the plan.

Local governments have the choice of implementing a suite of policy tools that meet water quality targets and that are suited to their individual needs and requirements. Some local governments already passed ordinances similar to those recommended in the Plan, while others did not. Other implementation tools were less practical in some areas than others. Recommendations were prioritized by county according to those that were considered vital to the Plan, and those that fell into a general recommendations category. Some governments may choose to focus on a few of the most effective policies (i.e. the stormwater management ordinance); others may want to implement a range of solutions. Implementation options are discussed in further detail

Features of a the Alcovy Watershed Protection Plan

The Alcovy Watershed Protection Plan was based on implementing a combination of solutions. Part of the long-term execution of the plan includes developing a strategy to incorporate specific recommendations for cities within the Alcovy watershed.



Policy Tools

- Improved Stormwater Management Ordinance
- Riparian Buffer Ordinance
- Conservation Subdivision Ordinance
- Transferable Development Rights (TDRs)

Incentive-based Tools

- Water Conservation Programs
- Land Acquisition Programs
- Alternative Wastewater Management

Other Implementation Tools

- Conservation Planning
- Regional Planning and Cooperation
- Continuous Watershed Monitoring and Model Calibration
- Stream Restoration and Urban Retrofit
- Incentives for Agricultural Best Management Practices
- Improved Enforcement of Existing Erosion and Sediment Control Ordinances
- Community Education and Partnering

Recommendations for Ongoing Public Involvement Efforts

The Alcovy River is a valuable resource for drinking water, recreation, and for support of its unique ecology. Citizens have repeatedly expressed interest at community presentations and public meetings, and within individual discussions in preserving its unique qualities. The Alcovy River Watershed Protection Project was only the first step in a long-term process of creating a communal legacy of water quality protection. The optimal time to cultivate this interest is now, before the projected rapid growth. Considerable time and effort has been invested in providing stakeholders with information necessary to make informed decisions concerning water quality protection.



These community stakeholders can become key leaders for influencing public opinion, and are a tremendous resource for creating a springboard for long-term citizen action.

Often, people are simply unaware of the steps they can take to influence policy decisions and other initiatives to protect water quality. This section provides avenues for sustained public involvement in the management of the Alcovy River and offers several productive outlets for citizen energy and interest. An increasing number of state and local governments have recognized that trained and motivated citizens can provide valuable input to decisions regarding watershed protection. The “Team Alcovy” public involvement process has established a link with stakeholders within the impacted communities, and ongoing public outreach efforts would reinforce the successful implementation of the Watershed Plan and long-term protection of the Alcovy. Mutually beneficial partnerships could be maintained with groups already exposed to the project and that are responding to the watershed protection message. Below are some recommendations for continued public involvement in the Alcovy River Watershed Protection.

Alcovy Watershed Council. Members of the Technical Advisory Committee (TAC) and other stakeholders involved in the Alcovy project have expressed a desire for the establishment of a permanent Alcovy Watershed Council. The primary mission of the Council would be to gauge the success of the implementation of the Watershed Protection Plan. Regularly held meetings would provide a forum for regional discussions regarding policy changes, ordinance enforcement, and other local implementation efforts. Council members should include, if possible, representatives from all 15 city and county jurisdictions within the watershed. Each county may want to consider appointing a watershed coordinator to assume this role. Other potential council members could include former TAC members, elected officials, City and County Planning and Code Enforcement representatives, Public Works and Water and Sewer Authority officials, state Environmental Protection Division representatives, Soil and Water Conservation Commission (SWCC) and Natural Resources Conservation Service (NRCS) staff, water resource professionals and representatives from interested community groups.

The Alcovy Watershed Council should take advantage of the successful partnering effort begun with the Alcovy Watershed Protection Project between regulatory agencies, local officials and community groups. Such a partnership ensures the continuation of regional cooperation for effective growth management and water quality protection. The continued data collection and model calibration is paramount to the accuracy of future watershed assessments and the success of planning efforts. Thus, the Council may also act as a steering committee to direct future water quality monitoring and data collection and to coordinate with the Northeast Georgia Regional Development Center for model development.



The Council should continue the dialogue between jurisdictions and should encourage upstream and downstream neighbors to work together to address common watershed issues. Formation of this group would harness the energy and creative ideas of a broad spectrum of interested parties. The council should provide quarterly or bi-annual progress reports to the elected officials and the public on watershed plan implementation. There are many examples around the country as well as in Georgia of successful watershed groups working to protect water resources on a basin-wide scale.

Community Watershed Groups. Natural partners to the Watershed Council are local Community Watershed Groups. These groups should be citizen-based with an emphasis on coordinating grassroots efforts for protecting water quality. With a goal of helping residents “get their feet wet” in the Alcovy, these groups could work with existing community programs in their area, such as Adopt-a-Stream, and facilitating the formation of others. These community groups would be a valuable resource to the Watershed Council and local officials in extending community outreach and education efforts. They would also provide a forum for local discussions, and report to the Watershed Council on issues of importance to the community, ensuring that the public remains involved. Oxford College is a possible vehicle for organizing monitoring efforts in Newton County. The Newton Smart Growth is an organization interested in efficient development planning.

Citizen Soil Watch Groups. The Upper Chattahoochee River Keeper has developed a Citizen Soil Watch program. Several similar groups are active in and around the Atlanta area. The goal of the program is to educate citizens about proper erosion and sediment control practices and who to contact when there is a problem. Training courses are given to provide citizens with the tools necessary to properly identify erosion and sediment control failures. A scorecard is used to rate various practices, and a model letter has been developed for reporting failures to local code enforcement officials. The limitations of such an assessment must be recognized. All assessments are conducted from public right-of-ways to avoid conflicts of public access to the property, and therefore are not as complete as normal routine inspections. However, the overall goal is to identify gross, obvious problems that have a high probability of adversely impacting downstream waterbodies.

The most successful citizen soil watch groups are those that work cooperatively with local governments. It is recommended that all citizen complaints be funneled through a trained representative of the soil watch group. This representative would then be responsible for filtering out unwarranted complaints to avoid the potential problem of overburdening enforcement officials with a flurry of phone calls and letters.



Adopt-a-Stream. Giving residents an opportunity to “get their feet wet” in neighborhood streams often creates the greatest “buy-in” to county-wide protection measures. The Georgia Department of Natural Resources Environmental Protection Division Adopt-a-Stream program trains citizen volunteers to collect and analyze water quality samples, conduct biological assessments, and document stream and watershed conditions. Adopt-a-Stream groups also conduct visual surveys, improve stream habitat, and conduct stream cleanups. Both Newton and Walton County have Adopt-a-Stream programs; however, membership has declined in recent years. Local governments can offer support to these groups in the form of increased publicity (water bill stuffers, local access television, newsletters, etc.) or through sponsorship of training classes (providing speakers, materials, meeting space, etc.).

Educational Curriculum. Educating future generations of citizens and water consumers is a valuable way to ensure long-term change in behaviors impacting the Alcovy River. Local governments can create an attachment to issues specific to their community by encouraging educators to include them in classroom assignments. *The Water Source Book*, designed for grades K-12, is a tremendous resource for introducing water resources issues into classrooms, as is *Project Wet*. Developed with teachers, water industry professionals, and others, both of these curricula have been approved by the State of Georgia for inclusion in classroom lesson plans. They each offer hands-on activities for students, guidance materials for teachers, and a matrix for identifying which elements address specific teaching goals. Water resources issues can be used in science, art, language, social studies, mathematics, and other disciplines to illustrate basic principles, while also conveying the water resource management message. With little effort, local governments could personalize the curriculum to include information specific to the Alcovy River and its challenges.

Partnerships. Reaching out to interested stakeholders within the watershed creates opportunities for successful partnerships. During the course of the Alcovy Watershed Protection Project, hundreds of residents were accessed through community presentations made at local civic and professional association meetings. Local governments can partner with these groups to sustain the open lines of communication established at these presentations. Requesting regular placement (yearly, quarterly) on meeting agendas to offer updates, provide educational information, and receive input would be a first step toward assisting key opinion leaders within the community in making informed decisions. These opinion leaders also often contribute to community understanding of issues.



LESSONS LEARNED

Political will across jurisdictions is fundamental to the initiation and continuation of regional cooperation for watershed assessment and protection. Local governments wishing to cultivate such cooperation can benefit from having the local Regional Development Center act as an “impartial clearinghouse” for coordination between cities and counties. This approach helped to successfully foster a cooperative spirit throughout the Alcovy Watershed Protection Project.

While the assessment and plan development represented a significant financial investment, it is only a first step for long-term protection. Implementation of the watershed protection plan will require a long-term commitment from each of the cities and counties in the Alcovy River watershed. The benefits of regional cooperation that were realized in the assessment and planning phases can also be realized in future implementation. For example, there is a cost-savings long-term sampling and model calibration if it is performed regionally rather than individually by each jurisdiction.

Full implementation of the Watershed Protection Plan will provide a range of other benefits for the residents of the Alcovy Basin. It is far more effective and economically efficient to prevent aquatic degradation through good planning and enforcement than it is to restore degraded streams and retrofit stormwater controls once development has occurred. Proper planning and regulation of development will provide for a healthy local economy, protect natural resources and ensure a high quality of life for future residents of the Alcovy watershed.