MEMORANDUM

To: Metro Atlanta Water Council
From: Kelly Adams, Kara Keene Cooper, and Josh Stephens, Policy Analysts
Date: April 26, 2011
RE: Augmenting Metro Atlanta’s Water Supply

Executive Summary

There are over five million people currently residing in the metro Atlanta region today. Due to its geographical location on the fall line, in a drought prone section of the country, and near the headwater of the smallest stream serving a population this size (the Chattahoochee River), this exponentially growing region faces water supply problems of economic proportions. These circumstances have been exacerbated over the past thirty years since the construction of Lake Lanier, the region’s main water source, into major issues with the rest of the state of Georgia, Florida, and Alabama. Because of metro Atlanta’s increasing water demand from both the river and Lake Lanier, state legislation has limited the amount of water the region is able to keep, and fears of Atlanta’s growth have deterred partnerships and collaboration with Florida and Alabama. The conflict between water users came to a head in 2007, after a record low level in Lake Lanier, when a federal judge ruled that metro Atlanta would have its access to Lake Lanier drastically reduced if a compromise could not be reached between Georgia, Florida, and Alabama. This dire situation led our policy team to adopt six policy goals to assist in choosing the best policy alternative to augment metro Atlanta’s water supplies: adherence to local, state, and federal laws; maximization of cost efficiency; minimization of environmental impacts; securing political support; meeting current and future water demand; and seeking resolution to congestion issues. Of the five policy alternatives we considered – creation of new reservoirs and expansion of existing reservoirs, conservation measures, interbasin transfers,
and the use of groundwater to supplement existing supply — we determined that a comprehensive plan consisting of components of each aforementioned alternative is the best solution for the issues facing the metro Atlanta region.

**METRO ATLANTA’S CONTROVERSIAL THIRST FOR WATER**

Metro Atlanta, and its five million residents, is currently facing a water crisis for a number of reasons: increasing population, susceptibility to droughts, and the real possibility of severely limited access to its primary drinking water supply.

Atlanta’s population has increased exponentially since its founding over 200 years ago and is currently the second fastest growing metro region in the country (Atlanta Regional Commission, 2009). Most of the country’s other metro regions that began in the 1800s were built on water sources. Atlanta was built on the fall line because this was a natural location for a booming railroad city. The city finds itself in an area with minimal groundwater collection because crystalline rock makes up the majority of its topography, and as its urban landscape has increased, the impervious surface has decreased to only 10 percent (Clayton, 2010). Therefore, the city of Atlanta relies heavily on surface water. The Army Corps of Engineers built Buford Dam along the Chattahoochee River in the 1950s. Although the primary reasons for the dam were to provide hydroelectric power and some flood control, the Corps also promised a sustainable water source for the metro Atlanta region for decades. Atlanta’s mayor at that time, William Hartsfield, did not help fund the dam, but the city of Atlanta began withdrawing water from it soon after the reservoir filled.

The metro Atlanta region has increased almost ten times in size since Buford Dam was completed in the 1950s, and the Atlanta Regional Commission “expects that 8.3 million people will call [it] home by the year 2040, an increase of roughly three million” (Atlanta Regional Commission, 2009). The city of Atlanta’s primary domestic water source, the Chattahoochee River, is the smallest stream in the United States serving a population of this size. To put the problem in perspective, Dallas, Texas, has a watershed that is 18,000 square feet to serve 11 million people. Lake Lanier’s watershed, serving metro Atlanta, is a meager 1,000 square feet
The ability to sustain its water supply is a dire concern for metro Atlanta.

On average, Georgia annually receives about the same amount of precipitation that is lost due to evapotranspiration. However, Georgia, as well as the other southeastern states, is prone to seasonal droughts. According to the Upper Chattahoochee Riverkeeper, the region “experienced ‘exceptional’ drought from 2006-2009, but also had extreme droughts in the late 80s and the late 90s when there were millions fewer people in metro Atlanta” (2011). These droughts severely strain the primary drinking water supply for Metro Atlanta, especially during times of increased demand during the summer months.

For over 30 years, metro Atlanta has battled with the rest of the state, Florida, and Alabama over its insatiable appetite for water from Lake Lanier. For every gallon that is taken out by water users in metro Atlanta, only 70 percent goes back to its original source, so each party is wary of the region’s usage of the headwaters (Kerr, 2010). Rural Georgia, who holds great power in the state legislature, has put many protections in place to limit the metro Atlanta’s usage of the headwaters. It was not until several years ago that farmers of the southern regions of the state were even required to document how much water they actually use. The farmers were initially afraid that if they documented their usage they would be held to that level and Atlanta would take the rest (Kerr, 2010). Alabama’s main concerns are for its growing population as well and their hydropower industry. Alabama Power is a major stakeholder in the negotiations and is a major political force within Alabama’s state legislature. Florida’s focal point is its fishing industry because it depends heavily on the sustainability of water ecosystems (Andreen, 2010).

The entire negotiations have been both politicized and secretive. The main break in the negotiations was in the early 1990s, when Georgia secretly made an agreement with the Corps of Engineers for more water without notifying Florida or Alabama. After this it was very difficult for the states to trust Georgia or continue negotiations (Andreen, 2010). Tensions boiled over beginning in 2007 when the region experienced an unprecedented drought. Lake Lanier, the primary source of drinking water, reached a record low level during that time (O’Day, Reece, & Nackers, 2009).
It was soon after this climax, in July 2009, that federal judge Paul Magnuson declared that Georgia would have to revert back to pre-1970 withdrawal rates from Lake Lanier if an amicable agreement with Alabama and Florida was not established within three years (Georgia Conservancy, n.d.). “At that time, the metro population was about 1.5 million people, less than a third of what it is today. Even Magnuson recognized it would be ‘a draconian result’” (Rankin, 2011). If an agreement is not made, reduced withdrawal rates would cripple the city’s ability to provide water to its residents. Despite these sobering facts regarding the water woes of Atlanta, the population and its demand for water continues to increase exponentially.

In short, the future economic growth for metro Atlanta as well as the well-being of its current and future residents requires immediate action to increase the water supply and to better manage this non-renewable resource.

ACHIEVABLE GOALS FOR AUGMENTING WATER SUPPLIES

Six specific policy goals will assist in the analysis of proposals to supplementing metro Atlanta’s water supply. The recommended proposal should adhere to local, state, and federal laws; maximize cost efficiency; minimize both local and regional environmental impacts; be politically feasible; meet current and future water demand; and ensure equal access.

Goal 1: Adherence to Local, State, and Federal Laws

The recommended proposal should adhere to all local, state, and federal laws. Federal regulations regarding water policy are primarily concerned with ensuring the delivery of safe drinking water, enforcing minimum allocation requirements for protecting endangered species, and preserving the chemical and physical integrity of natural water bodies. Passed in 1973, the Endangered Species Act ensures the continued existence of listed endangered species (EPA, n.d.). In relation to water policy, this Act essentially bypasses existing water allocation agreements in order to ensure ecosystems with endangered species receive a minimum amount of water to guarantee their survival (Clayton, 2009). Biological and ecological studies determine minimum water requirements. The proposal will adhere to requirements set forth
by the Act in order to protect endangered species in Georgia as well as those in the downstream states of Florida and Alabama.

Congress passed the Clean Water Act in 1972 and the Safe Drinking Water Act in 1974. The Clean Water Act protects the chemical and physical integrity of surface water bodies. The Safe Drinking Water Act regulates both the source of water supplies (rivers, lakes, reservoirs, springs, and groundwater wells) as well as the public water systems that provide safe water to customers (EPA, n.d.). The Safe Drinking Water Act is especially important when evaluating the potential impacts of using reclaimed or recycled water for consumption purposes (Shannon et al., 2008). Water contaminants can come from both anthropogenic and natural sources. Common anthropogenic sources in metro Atlanta include urban runoff of oils, grease, and pesticides into storm drains and excess siltation from construction activities (Brosnan et al., 1999). The most common natural contaminant is low level radiation and radon gas from naturally occurring elements in the soil and bedrock (Butler and Kahn, 1995). The recommended proposal will aim to meet all stringent monitoring federal requirements and limit both anthropogenic and natural impacts to drinking water supplies, especially during construction activities.

Georgia's water regulations predominantly serve two main purposes: managing the state's water resources and administering programs to meet federal water regulations. As is Florida and Alabama, Georgia is a riparian state. Therefore, Georgia manages its natural water bodies using guaranteed riparian rights. Some of the more important rights include "reasonable" use (i.e. domestic and regulated market use) as long as it does not adversely impact downstream users, gaining access to the water, fishing, and proportional allotment, (Geches, 2009). State management of water resources also includes oversight of large-scale public works projects when they are financed by the state or encompass multiple jurisdictional boundaries. The Georgia Department of Natural Resources maintains a strict permitting and enforcement system to ensure that federal regulations are met (GA EPD, n.d.). The proposal will adhere to all guaranteed riparian water rights and permitting requirements established by the Georgia Department of Natural Resources.
Since local governments in Georgia are most often responsible for supplying water to its residents, their water regulations are predominantly rooted in economics. Local water regulations include provisions for hookup fees, water rates, and infrastructure costs. Local governments also adopt ordinances to ensure that federal guidelines are not violated.

**Goal 2: Maximize Cost Efficiency**

The recommended proposal should maximize cost efficiency by using proven economic models. Cost-benefit analysis is the hallmark of measuring economic efficiency. Since the recommended proposal will likely include large-scale infrastructure projects, cost-benefit analysis would seem like a good tool to measure economic efficiency. However, a pure cost-benefit model that uses a strict interpretation of the Kaldor-Hicks criterion does invoke criticisms. Common criticisms include using abnormally high or low values to bias the results towards a specific agenda (McGarity, 1998), ignoring costs or benefits because of the difficulty of monetizing them (McGarity, 1998), the uncertainty of future returns (Newell & Pizer, 2003), the absence of ethical or distributional concerns (Hansjurgens, 2004), and inadequate estimates that weaken conclusions (McGarity, 1998).

Despite these criticisms, pure cost-benefit models will likely suffice when there are no ethical or distributional concerns. If these concerns do arise, contingent valuations that attempt to monetize “willingness to accept” or “willingness to pay” can be incorporated into cost-benefit models. All inputs should be accurately monetized using proven techniques and sound research (McGarity, 1998). A cost-efficiency model, using a fixed budget or effectiveness approach, is a viable option if certain inputs of the cost-benefit model are unable to be monetized or if the monetized values conflict with other policy goals (Weimer & Vining, 2011).

The recommended proposal will likely be complex and comprehensive, including a number of mechanisms to increase the water supply of Atlanta. These mechanisms will vary in cost, magnitude of impact, and the time required for completion. Some projects may be completed in a few years whereas others may require a decade or longer. Some projects may cost relatively little ($1 or 2 million) whereas others may cost much more (nearly $1 billion). Cost-benefit analysis, or some applicable variation, will ensure that planned water projects are
implemented in a manner that increases the water supply using public and private funds as efficiently as possible. The analysis will evaluate current revenue streams, investment options, and potential revenue streams.

**Goal 3: Reducing Environmental Impact**

Increasing the water supply of a region this size will likely require construction activities, land disturbance, and the movement of massive amounts of water. Examples include reservoir building and the expansion of water system infrastructure. Although these activities will adversely impact the environment’s natural state, the following tools can reduce the environmental impact.

Firstly, the Georgia Environmental Policy Act requires the completion of both an environmental assessment and an Environmental Effects Report if the state engages in any activity that may adversely impact the surrounding environment. The assessment requires a qualified environmental professional to evaluate the potential impact of 24 social, historical, and environmental specific target areas (GA EPD, 1991). Any potential harm identified during the investigation is routed to the appropriate state and/or federal agency so that it can be properly addressed.

Secondly, lending institutions will most certainly require the completion of Phase I and Phase II Environmental Site Assessments if Georgia purchases land for the development of water resources. A Phase I Investigation identifies past uses of the target properties whereas a Phase II Investigation requires the collection of soil and/or groundwater samples to determine the condition of the target properties (Hejzlar, 1999). These Phase I and Phase II Reports do not typically include as much detail as the Environmental Effects Report but are thorough. Any identified hazards are routed to appropriate state and/or federal agency so that they are handled safely and expeditiously.

Lastly, if any construction project requires federal funding, then the National Environmental Policy Act requires the state of Georgia to perform an Environmental Impact Assessment and an Environmental Impact Statement if necessary. Unlike the previous environmental assessments, a critical requirement of this assessment is mandatory public
review and comment. Furthermore, this assessment is often more detailed and thorough. Although recently streamlined, this assessment can cost millions of dollars and require two to six years to complete depending on the scope of the project (Phelan, 2007).

Goal 4: Increasing Political Feasibility

Surprisingly, there is little research on increasing political feasibility despite being a critical component of policy analysis. However, the following guidelines will greatly increase political feasibility. A common theme among the limited literature is the understanding of key actors and players. You must understand their beliefs, motivations, available resources, interests, influence, and political power (Dror, 1969 and Meltsner, 1972). You should also consider exogenous factors such as political pressure, opportunistic “time windows”, public opinions, and economic conditions (Dror, 1969).

Webber points out that you can increase political feasibility by addressing certain factors at each stage of the policy process. For example, the key factor to address during agenda setting is the “policy window”, and the key factor to address during policy formulation is decision support. The policy legitimation stage requires careful attention to ideological consistency and broad public support. Lastly, the policy implementation stage requires bureaucratic support (1986).

Specifically regarding natural resources, political feasibility often hinges on conflict resolution using mediation or facilitation. Facilitation requires a third party to encourage open dialogue and meaningful collaboration. Mediation goes one step further by granting the third party decision-making powers to solve problems (Kimberly et al., 1997).

Goal 5: Meeting Current & Future Water Demand

Meeting current and future water demand in metro Atlanta will require the use of sound planning principles. Firstly, the implementing agency should inventory current consumptive users, most notably industries and populations. Once inventories are established, they should be translated into their respective water demands. Regression analysis, market
trend analysis, experimental uncertainty analysis, and modeling using Geographic Information Systems (GIS) will ensure accurate predictions of population and business growth.

**Goal 6: Reducing Congestion of a Common Property Good**

In order to reduce congestion of a common property good (such as water) and ensure equal access, it is imperative to outline the mechanisms in which congestion can occur. The recommended proposal will likely include the purchasing of land along waterways for the development of new water supplies such as dammed reservoirs. Essentially, the water is a “free good” that is attached to the newly owned property. The new landowner, most likely the state of Georgia, is a now a riparian among many others along the same river. Although each riparian is guaranteed certain rights, they are collective rights. In other words, they must be shared.

Congestion can occur if one or more riparian users adversely impact others, essentially excluding them from realizing any of their guaranteed rights (Weimer & Vining, 2011). The proposal should attempt to limit potential congestion by adhering to principles of riparian water law such as defined water rights, enforcement of “reasonable use”, and consideration of permitted public water systems (Geches, 2009). Another possible solution to minimize congestion is to allow “offenders” to compensate “victims” through negotiation. However, market-driven solutions are not without controversy. Concerns include the potential of monopolization and the marginalization of environmental stakeholders (Clayton, 2009).

Congestion can also occur if a public agency owns the new water body and allows it to be used for both a potable water supply and recreation. As more recreational users consume the lake, there is the potential to exclude future recreational users AND hinder efforts to increase the supply of potable water. In other words, interests can clash especially over the long term.

**POSSIBLE SOLUTIONS TO METRO ATLANTA’S WATER CRISIS**

Georgia lawmakers have already introduced several measures meant to augment the water supply of the metro Atlanta region whether through conservation or supplementation.
While these steps are important, they are not a comprehensive solution to the augmentation of the region’s water supply. In order to determine the proper components of this comprehensive plan, our policy team analyzed several alternatives. These alternatives include the following: creation of new reservoirs and expansion of existing reservoirs, conservation measures, interbasin transfers, and the use of groundwater to supplement existing supply. In the following section, we evaluate each of these alternatives using the aforementioned policy goals, as well as their perceived impact on the citizens of the metro Atlanta region.

**Alternative 1: Reservoirs**

Lake Lanier is a primary water source for millions of people in the metro Atlanta region. With the threat of losing access to the reservoir for water supply, lawmakers and Georgia’s Governor Nathan Deal have proposed the development of new reservoirs throughout the region to supplement the water that may be lost should Judge Magnuson’s ruling take effect in 2012. In his proposed budget for the state of Georgia for fiscal year 2012, Governor Deal allocated $25 million to the Department of Community Affairs for the purpose of funding reservoirs as well as $20.75 million to the Georgia Environmental Finance Authority to fund reservoir development (Deal, 2011). While this is a significant amount of funding, it will only provide funding for researching new sites for reservoir development. The actual costs of building a new reservoir are significantly higher.

To put the costs and time of building reservoirs into perspective we can look at the Glades Reservoir Project in north Georgia. Engineering and design of the proposed Glades Reservoir Project in Hall County is slated to begin in late 2011. Construction will begin in 2012. The projected date that the reservoir will be operational is 2016. This reservoir is expected to augment the water supply for Hall County by providing 80 million gallons of water per day. The actual funding required to complete this project from start to finish is projected at $345 million with inflation. This figure includes the funding for land acquisition, reservoir construction, pump stations, and pipelines. (Hall County, 2010). This is only the price of one reservoir. With Nathan Deal’s push to construct multiple reservoirs over the next ten years, the amount of funding required by state and local taxpayers will total in the billions. The timeline of this
project also presents a problem. Lake Lanier will be unavailable to the region in 2012 should Judge Magnuson’s ruling go into effect. Other reservoir construction projects would be on the same timeline as the Glades Reservoir project or have not even begun. As a long-term solution to increasing the water supply, reservoirs are a viable option; however, the short-term options are just as, if not more, important.

Reservoirs have a significant impact on the environment not only in the immediate vicinity of the reservoir, but also downstream and upstream of the site as well as the surrounding riparian land by altering the amount of flow in the river system that they are located within. River ecosystems are disturbed with altered river flow. Plants and animals that rely on the natural pattern of increased and decreased river flows are hindered in their natural ability to survive in the river. The path that fish take through the river is disrupted. Reservoirs also accelerate the loss of water from the river system due to an increased rate of evaporation from the reservoirs. A dam on a river also disrupts sediment transport throughout the system. Sediment transport is important in creating the fertile riparian land surrounding rivers. These riparian lands are crucial to the agricultural community in the state of Georgia (Davis, 2002). However, following local, state, and/or federal regulations regarding environmental assessments can minimize these impacts. New reservoirs would supplement the water supply in metro Atlanta tremendously in the long run by adding billions of gallons of water to the supply. They also provide recreation opportunities for the general public. Although Georgia has the guaranteed riparian right to build reservoirs, they must adhere to all laws. Most notably, Georgia’s new reservoirs cannot adversely impact downstream users. Therefore, extensive negotiation and litigation will be required among all stakeholders. Furthermore, in order to avoid congestion issues, the purposes of all new reservoirs will be clearly defined and enforced.

Alternative 2: Interbasin Transfers

Interbasin transfers are already being used to supplement the water supply in metro Atlanta. These transfers involve taking water from one river basin and transferring it to another basin that has a larger demand for water consumption. These transfers must be strictly
regulated to have the smallest impact on all stakeholders involved; however, the political and legal language surrounding these transfers is vague and garners little support from state lawmakers in Georgia. Many issues arise from the use of interbasin transfers. Key among these issues are environmental concerns, technical feasibility, protecting the rights of all stakeholders involved in the process, as well as the impact on the lives of those in the different river basins, the economic distribution of the transfers, and the overall political process involved in regulating these transfers (J. Gupta, 2008).

Interbasin transfers will be necessary for supplementing the water supply in metro Atlanta should Judge Magnuson’s ruling take effect; however, strict regulations must be included to ensure the issues above are considered. One key issue is how will the transfer of water from one basin benefit both parties involved in the process? You should consider the economic impact on the region losing water from its river basin (Draper, 2004). In the 2011 legislative session, several bills regarding interbasin transfers were introduced; however, none of these bills passed. This failure to begin the process of regulating interbasin transfers with a legal framework relates to the hesitance of legislators from regions of Georgia not included in metro Atlanta to adopt such laws. These legislators fear the impact interbasin transfers will have on the rest of the state while metro Atlanta benefits with increased water consumption (Draper, 2004).

Interbasin transfers have the potential to significantly damage the environment. Sally Bethea, the executive director of Upper Chattahoochee Riverkeeper in Atlanta, has expressed concerns about the environmental impact of these transfers. She uses the Flint River as an example, stating the flows into the river have reduced 60 percent since the 1970s partly due to these transfers. She also brings up the issue that interbasin transfers decrease the amount of water flowing to Alabama and Florida (Bethea, 2011). With the current legal battle, this alternative presents many challenges that may harm Georgia’s standing in the conflict.

Alternative 3: Groundwater Supplement

The booming development in the metro Atlanta region has caused a significant decrease in the amount of groundwater available to supplement the water supply. The imperviousness
of the groundwater aquifers in the area has been caused by paving over groundwater storage areas, as well as the deforestation that occurs alongside urbanization (Rose and Peters 2001). Groundwater supplementation would provide the most environmentally and politically friendly alternative to supplementing the water supply. This would also be a popular alternative in the Tri-State Water War as it would have virtually no impact on the states of Florida and Alabama. Further research must be conducted in order to determine if groundwater supplementation would become a feasible and effective alternative to increase metro Atlanta’s water supply. Responsible planning must also be implemented for future developments to reduce the impact urbanization has on groundwater aquifers throughout the region. It is not anticipated that groundwater would have a major impact on metro Atlanta’s total water supplies; however, it could possibly be used to supplement water demand for new, relatively small communities built in metro Atlanta.

Alternative 4: Conservation Programs/Upgrades

Conservation is the most important alternative to consider. Not only would conservation methods positively impact the water supply in the metro Atlanta region, but they would also show that Georgia is serious about making progress in the Tri-State Water War dispute. This is important in possibly saving Lake Lanier as a water supply source for the region. Conservation measures have already been implemented in the metro Atlanta region by the Metro North Georgia Water Planning District. These measures, implemented in 2009, include upgrades and retrofits of current water infrastructure, a toilet rebate program that encourages homeowners and housing managers to upgrade older toilets to more efficient models, upgrades of meters to include leak detection systems to prevent significant waste caused by leaks, enacting a water waster policy that prevents outdoor water use at certain times, and the development of a comprehensive water conservation plan (Metro North Georgia Water Planning District, 2010). These measures are all steps in the right direction, and the inclusion of a comprehensive water conservation plan provides the structure needed to ensure these measures are effective.
**Alternative 5: Comprehensive Water Plan**

The alternative suggested by our team of analysts is a plan that would incorporate reservoir construction, interbasin transfers, groundwater exploration, and expanded conservation programs and upgrades as a comprehensive solution to supplement the water supply in metro Atlanta. These measures combined would provide both short-term and long-term solutions to aid the region should Lake Lanier be lost as a water source. While the same political and regional implications presented in each previous section would be present with a comprehensive plan, they would all be necessary in order to ensure Atlanta continues to thrive as an economic center in the Southeast. This comprehensive plan requires metro Atlanta to conduct extensive research in order to quantify its actual water need and the Water Council to establish a technical advisory committee, consisting of water policy experts, to ensure that all policy goals are achieved throughout the decision making process.

**CONCLUDING REMARKS**

The strengths of the Comprehensive Plan approach include its ability to facilitate short and long-term initiatives concurrently and to be implemented over many years so that financing is not needed all at once. Since some of the components of the plan are very expensive, such as reservoir building, research can be done in the next few years while funding is allocated each year for the infrastructure and construction. Inexpensive measures such as conservation efforts can be immediately put into place for current supplementation. However, there are trade-offs associated with a comprehensive plan. Until some of the major long-term projects are complete there could be periods of scarcity of water for the region. Conservation is what it is – conserving water, not augmenting the current supply. Furthermore, there will still be political and legal issues among all stakeholders. The Atlanta Regional Commission should work with these business and political leaders to encourage collaboration and effective planning. The Atlanta Regional Commission should also take a more proactive role in educating the Georgia general assembly about all alternatives, especially interbasin transfers. There are no easy winners from the implementation of any of these alternatives; however, the Comprehensive Plan provides the best approach for ensuring a sustainable water supply for
generations to come. Simply stated, should metro Atlanta’s water supply “be cut off” in 2012 because of the restrictions of usage of Lake Lanier or “run out” in 2017 because no augmenting efforts have moved forward, the region may never recover.
### Appendix 1. Criterion Alternative Matrix

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<thead>
<tr>
<th>Policy Goals</th>
<th>Impact Categories</th>
<th>Policy I</th>
<th>Policy II</th>
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<th>Policy IV</th>
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Works Cited


