Written Testimony

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The three key points of this testimony are 1) Water in sufficient quality and quantity is essential for growing our economy, protecting our health and ensuring the security of our nation; 2) There is cause for hope in the numerous examples around our country on how state and local governments are saving money by investing in watershed conservation and the use of green infrastructure; and 3) that the Federal government's support, although helpful, needs to be expanded.

Water defines Maine, it is Maine's most essential resource. The image of Maine as a naturally beautiful state depends on safeguarding its water resources. Water resources are vital to keeping and attracting vibrant businesses and residents, as well as to keeping tourists returning year after year. This image of Maine and its high quality of life and access to natural amenities plays a big role in Maine's robust tourism industry and its economic growth. Maine needs high skilled workers that are fundamental to the innovation economy and Maine's future prosperity, and clean water and outdoor amenities are a big part of the draw. Notable examples from Maine of the role that clean water plays include the siting of 2 computer chip manufacturers with high paying jobs that rely on the quantity and quality of available clean water in their manufacturing process. Similarly, the proliferation of micro-breweries in Maine also requires high quality and a massive quantity of tap water as an input to the brewing process. Finally, Maine's colleges and private High Schools have seen an increase in foreign student attendance and when parents were surveyed and asked why they send their children across the world to Maine for school, one of the reasons sited was to give their children access to clean air and water for 4 years.

Tourism is one of the biggest industries in Maine. The Casco Bay watershed alone employs almost 20,000 people in tourism and recreation which is directly and indirectly supported by the Bay's health. Frenchman Bay (where Bar Harbor is situated), Acadia National Park and the Katahdin Woods and Waters National Monument all depend on the maintenance of Maine's clean waters.

Just as in Maine, our entire country is ripe with numerous opportunities for using natural and green infrastructure approaches to protect our water resources.

Maintaining Drinking Water Quality: Maine is changing, and like much of the country, its dispersed population growth has spread development into large undeveloped areas that once functioned as filters and distributors of water flow. New suburban house-lots and impervious roads contribute polluted runoff directly into our waterways, harming water quality, wildlife habitat and exacerbating flooding downstream. And, increasingly frequent and extreme precipitation has increased the likelihood of floods and infrastructure damages. For example a few tears ago, York County on Maine's southern coast, experienced 100 and 500 year floods within a single year.

When federal water quality standards are reached and exceeded, cash strapped municipalities and regions need to find solutions they can afford. There are numerous opportunities for Maine and the rest of the country to meet the demands for new, upgraded, and expanded water resources management by

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incorporating “natural infrastructure” (forests and wetlands that naturally infiltrate, absorb, and clean non-point source runoff) and “built green infrastructure” (which are lower cost decentralized engineered structures that mimic natural systems like bio-swales, raingardens, green roofs, cisterns, etc.), and to do it at a much lower cost than is often thought possible.

Sometimes NOT building new infrastructure could be the most efficient and effective way to manage water. It has become clear that water resources are most effectively and efficiently managed by both building, and not building, new infrastructure.

New York City confronted this problem a decade ago. After a cost/benefit analysis, the City decided it would be more cost effective to conserve land by purchasing it for the substantial sum of $1.4 Billion, which was still less than $3.0 to $6.0 billion in capital construction costs (plus $250 million in annual operating costs) that would have been required in the alternative. New York’s approach requires that land conservation be on a strictly willing seller-willing buyer basis and the conserved lands are open for an array of recreational uses from hunting and fishing to hiking and cross-country skiing.

While a water system serving nine million people may seem an out-of-scale comparison for Maine, the New York experience has very useful lessons for Maine. A great example, located in Sen King’s backyard, is the Sebago Lake watershed. It supplies high quality drinking water in plentiful supply to the greater Portland area, which is the economic engine of the entire state.

Waivers from the Federal Safe Drinking Water Act’s Surface Water Treatment Rule are relatively rare, and require a water system to maintain stringent standards for source water protection in their supply watersheds. The Portland Water District’s supply, Sebago Lake, has some of the cleanest water in the United States, but it is threatened by development pressure, which, if unchecked, could foul the supply. Should the quality of the water supply fall below the Federally-mandated thresholds, the Portland Water District could lose its filtration avoidance waiver and would have to build a filtration plant—an extremely expensive proposition. Alternately, Portland Water District could follow a similar path to New York City, and argue to maintain its filtration waiver through investment in the permanent conservation of the Sebago Lake watershed.

A complex mix of scenarios involving different options for investment timing and costs were analyzed, and a study found that a combinations of riparian buffers, culvert upgrades, conservation easements, and sustainable management of forests were less expensive than building new water filtration facility. In one case examined, $44 million in expenditures on these natural and diffused infrastructure options could save over $110 million to build a new filtration plant. The cost to protect the existing natural infrastructure that would support a continued healthy watershed is approximately 1/3 of what it would cost to build a filtration plant, and if we add the other benefits of protecting land such as recreation, wildlife habitat, carbon sequestration, and other ecosystem services, the net benefits become even greater. There are also “ancillary benefits” such as carbon sequestration or Atlantic salmon habitat associated with the choice to use natural infrastructure options. The economic value of these “nonmarket benefits” are not insignificant. They are estimated to range from $72 to $125 million over a 20 year time period.

Portland’s experience is likely to be shared to one degree or another with other Maine public water systems in places like Lewiston, Auburn, Damariscotta, Bangor, Mt. Desert Island, and Brewer. These are

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among nine Maine systems that currently hold waivers from the EPA relieving them of the requirement to build filtration systems. Maintenance of those waivers is a very high priority for each system.

While much of the concern about adequate water resources infrastructure is centered on the challenges likely to result from a much wetter climate in the future, a changing climate is also likely to result in periods of drought in some or all of Maine at irregular intervals (Gupta et al, 2008). While drought may reduce the need for flood hazard protections, it will increase pressure on the maintenance of adequate safe drinking water supplies. The types of benefits for the PWD are likely to be significantly larger if natural infrastructure can be used to maintain drinking water quality even in periods of low water replenishment and flows.

The economic assessment of the alternative approaches to water resource management falls within the general field of benefit-cost analysis. This type of analysis seeks to enable the comparison of gains from a particular approach with the resources that must be given up. For water resources, the gains fall into two general categories: "avoided costs," which are possible future losses or alternate expenditures to achieve the same outcome, and "non-market benefits," such as the value of wildlife habitat, scenic lands, or healthy ecosystems. Extensive studies of both types of benefits have been done, but the measurement of non-market benefits requires more complex methodologies that have generally not been used in Maine. Nonetheless, the differences between what must be spent now to manage water resources and the spending that can be avoided in the future are often so large that, even though it would be beneficial to have it, no additional measurement of benefits is needed to make a compelling case.

Maine is fortunate in still having abundant land that can provide a variety of natural infrastructure services. A recent analysis estimates the amount of land in Maine whose conservation could help to maintain drinking water quality to range from 17,000 acres (including places where both drinking water and flood control benefits would accrue) to 825,000 acres (where either one could be protected). (If places providing water-related wildlife habitat are included, the number goes up to 1.6 million acres.). Maine has a quarter century of experience in acquiring conservation easements and purchasing lands through state programs. At prices ranging from $755 per acre in Piscataquis County to nearly $6,000 per acre in Cumberland County for an overall average price of $2,100 per acre. Taking the average price for conserving land, the 17,000 acres that provide both flood control and drinking water benefits would require around $28 million, which is about 10% of the value of current public water supply infrastructure exempt from property taxes under Maine law. Purchase of fee or conservation easements on all the land estimated to be valuable for drinking water protection or flood control would cost $1.36 billion at this average price, less than 1% of the total value of land in Maine, which is estimated to be $153 billion.

Flood Damage Control: Numerous studies have shown the importance of maintaining open space, forestlands, and wetlands to mitigate flood damages. A particularly clear example arises from Vermont's recent experience with Tropical Storm Irene. The Otter Creek in mid-Vermont saw flows increase from a normal 1,000 cubic feet per second (cfs) to over 12,000 cfs at Rutland in the days immediately following the storm, causing significant damage to Rutland and the surrounding towns. Further downstream at Middlebury, VT., where flows should have been even higher, it was a dramatically different story. Peak Flows were less than half the level at Rutland because a largely conserved wetland complex between Rutland and Middlebury was able to absorb much of the flood waters, releasing them slowly over time.

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To examine the potential for reducing flood damages in Maine through the use of such natural infrastructure, a simulation of the risks of flood damages in three York County watersheds was undertaken. That analysis found that possible reductions in flood damages would yield over $275 million in present value benefits over a thirty-year period. These savings are compared against the cost of conserving land to mitigate flood damages, an estimated $15.0 million. In small watersheds, the costs may not exceed the benefits, but in large watersheds, the benefits of conserving land for flood control can be more than 100 times the costs.

Using natural infrastructure to mitigate coastal flooding damages is already embedded in Maine law in the Natural Resources Protection Act as applied to coastal sand dunes and other wetlands. Studies have shown the increasing economic vulnerabilities along Maine's shoreline from sea level rise. To date, no specific studies have been done in Maine to assess the costs in damages and repairs to public and private property that could be avoided by investments that protect and restore coastal wetlands. Still, such studies in other parts of the country clearly demonstrate the economic benefit and importance of preserving and restoring coastal wetlands.

Upgrading Culverts: Culverts are perhaps the least visible elements of the infrastructure that we use every day, but roads collapse when culverts fail. The vast majority of culverts in Maine were designed to meet standards half a century out of date. When storm waters overwhelm these too narrow culverts, they undermine the substrate and leave travelers stranded. Road commissioners face pressures to replace the culvert and reopen the road as quickly as possible. Unfortunately, the default is to set in place a culvert no larger than the one that just failed. That is because smaller culverts cost less and require no new engineering plans and because federal policy for assistance to states and communities after major storms requires that replacements be of the same size as those damaged. These decisions simply set the stage for failure in future storms.

Studies cited in Maine, New Hampshire, and elsewhere show that a large number of culverts will not accommodate expected increases in extreme precipitation events. The choice is between upgrades to more appropriately sized structures now to prevent catastrophic failures or much higher costs in the future when they do fail. While both the costs and benefits of upgrades depend on the specific location, some estimates indicate that upgrades now are likely to cost about half again the cost of simply replacing substandard culverts with similarly sized culverts. Rough projections suggest that a total investment of approximately $14-28 million would be required to cover the increased costs of upgrading Maine's highest priority culverts. While these upgrades are expected to result in significant future savings, estimates of these savings have not been modeled in Maine.

Managing Stormwater: After years of delay, the Environmental Protection Agency has moved to enforce the requirements of the Clean Water Act directing municipalities to reduce pollution overflows into water bodies. When rainstorms overwhelm the capacity of sanitary sewers to treat wastes, large quantities of untreated sewage are released in rivers and coastal waters. Retrofitting sewer systems to separate stormwater from waste water can be enormously expensive, so cities are looking for ways to reduce the flows of water resulting from rainstorms that enter the waste water systems. The goal is either for current systems to handle the runoff or for separated stormwater systems to be reduced in size.

Conservation of open space, forests, and wetlands to reduce flood damages also provides benefits in the management of stormwater. But rain that falls in the more developed urban areas often has the greatest impacts in terms of stormwater runoff, and this must be managed by employing a variety of

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strategies to reduce flows. Collectively known as Low Impact Development (LID), these include innovations in roof design, porous paving materials, and biological retention areas. Such diffused infrastructure systems come at much lower cost than building complete separation systems. In a study of eleven municipal stormwater management programs, ten showed lower costs using Low Impact Development than building separation systems.

The diffused nature of LID infrastructure systems also likely increase security by relying on a diversity of approaches rather than centralized facilities**.**

Finding alternatives to high cost separation systems is a matter of some urgency for Maine. The Maine Department of Environmental Protection estimates that communities have already spent $415 million to address stormwater issues and will invest an additional $142 million between 2012-17. Portland, Maine was on a path of relying heavily on gray infrastructure and had plans to build detention systems for tens of Millions of dollars to reduce flows into the Back Cove. After years of public process the Portland Stormwater Task Force made a unanimous recommendation to the Portland City Council to form a stormwater utility. The enterprise fund was set up in a fair and equitable way that was based on non-pervious area lot size and included non-profit entities (Hospitals, churches, universities, etc.) and businesses to pay for their share of non-pervious areas. Because of the thorough process and the fair distribution of costs, the stormwater utility was approved unanimously at the Portland City Council. The utility collects fees that goes solely to stormwater management projects and has not been challenged to date. The use of a mix of gray (pipes) and green infrastructure is a priority for Portland, Maine, in order to reduce the total cost of needed stormwater infrastructure.

Municipalities in the Bangor area as well as South Portland are actively promoting the use of LID techniques in current and new construction to reduce the need for expensive new systems in the future. The Bangor Area Stormwater Group claims a savings of over $400,000 to date by using LID approaches.

There is strong evidence both within Maine and elsewhere of the economic benefits of new strategies for water resources infrastructure that maintains, restores, or mimics the functioning of natural systems. The system-level evidence provides clear support for funding policies that enable the use of natural infrastructure and diffused built infrastructure to meet water resource management needs. Not surprisingly, the evidence indicates the necessity of case-by-case analysis of costs and benefits. Still it is important to note that the projections included here are significant underestimates of the benefits associated with natural infrastructure. This is because the economic benefits associated with preservation of wildlife habitat, open space, and recreation are not included in the analysis. This compelling, though incomplete, picture of the economic benefits suggests that financing programs should require or encourage the use of economic analysis in the evaluation of projects and that state agencies should develop the data and support systems to enable the most cost effective strategies to be chosen.

Evidence from Maine and elsewhere clearly supports serious and detailed consideration of using natural infrastructure approaches to mitigate flood risks in river watersheds and to avoid having to invest in expensive filtration plants to protect drinking water. There is also strong economic support for finding ways to use lower cost built infrastructure approaches like Low Impact Development for managing storm water runoff. Studies in Maine and elsewhere indicate that natural and low cost built infrastructure may be cost effective in coastal flood damage mitigation and in upgrading culverts to reduce damage to transportation systems and ecosystems.

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Financing Water Management: The challenge for Maine and the rest of the country is to find the resources to make the needed investments to protect natural infrastructure and to have financial incentives to increase the use of green infrastructure, LID and best management practices (built green infrastructure) to manage stormwater at the local level.

A number of federal and state funding programs exist that can enable states, municipalities and non-profit organizations to invest in natural and built green infrastructure. Federal and state funding programs such as WIFIA (the Water Infrastructure Finance and Innovation Act) and State Revolving Funds exist but provide far too few resources to meet the substantial investment needs of states. Innovative local governments like the City of Portland, Maine and many other communities in the country have enacted stormwater utilities and are investing in green infrastructure. Help from the Federal government such as matching funds to communities that have enacted stormwater utilities or other enterprise funds for the purpose of managing stormwater would go a long way to incentivize many more innovative actions to use built green infrastructure at the local level.

Significant reductions in federal funding for land and water conservation, combined with a gradual reduction in state funding levels, yield far too few resources to meet the substantial investment need described in this testimony. There is a genuine need for new sources of funding focused on securing the natural and built green infrastructure that sustains Maine's and other states' water resources. Such new funding sources, if carefully designed and strategically implemented, could avoid considerable future costs for Maine and other states, secure valuable benefits and services now, and catalyze investment by municipal, federal and private sources.

The compelling picture of economic benefits presented here suggests that financing programs should require or encourage the use of economic analysis in the evaluation of projects and that state agencies should develop the data and support systems to enable the most cost effective strategies to be chosen. Careful choices about water infrastructure will require careful maintenance of data.

Water is so fundamental to the image of the state of Maine that one of its most successful business, which bottles and exports huge volumes of it, brands it as "what it means to be from Maine." For many and sound reasons, investing in water resources makes sense for Maine and the rest of the country and those investments can be made at lower costs and with greater benefits than was previously thought possible.

Much of the evidence in this testimony comes from *An Assessment of the Economics of Natural and Built Infrastructure for Water Resources in Maine*, Colgan, C., Merrill, S., Yakovleff, D., 2013.

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