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Testimony Before
The Subcommittee on Water and Power
and
The Subcommittee on National Parks, Forests, and Public Lands
of
The Committee on Natural Resources

Hearing on:

Mountain Pine Beetle: Strategies for Protecting the West

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Testimony Presented by Eric Wilkinson
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INTRODUCTION

The Northern Colorado Water Conservancy District (Northern Water) was created by decree of the Weld County District Court in September 1937 as the first water conservancy district in the State of Colorado. Northern Water is located along the northern front range of Colorado, extending from the City and County of Broomfield and Fort Lupton on the south, to north of Fort Collins and Greeley on the north, then extending northeastward along the South Platte River to the Colorado/Nebraska state line (see Attachment 1). Northern Water encompasses parts of eight counties and includes approximately 1.6 million acres within its boundaries, including about 640,000 acres of irrigated farmland. The constituency population of Northern Water is approximately 800,000 people.

The impetus for the creation of Northern Water was to serve as the sponsoring agency to contract with the United States, through the Bureau of Reclamation (Reclamation), for the design, construction, operation, and maintenance of the Colorado-Big Thompson Project (C-BT Project). The 220,000 acre-feet of high quality, supplemental water supplies that are diverted on average each year by the C-BT Project from the headwaters of the Colorado River into the South Platte Basin for use by the constituents of Northern Water, are as important today to the health, economy, and sustainability of northeastern Colorado as they have ever been during the history of the C-BT Project.

An explanation of the background and history related to the development and operation of the C-BT Project and Northern Water is contained in Attachment 2 to this testimony entitled "Background and History of the Northern Colorado Water Conservancy District and the Colorado-Big Thompson Project."

C-BT PROJECT WEST SLOPE COLLECTION SYSTEM

The 220,000 acre-feet of average annual yield provided by the C-BT Project is captured from the 466 square-mile watershed located within the headwaters of the Colorado River. Over the past 15 years, this watershed has been severely infested by the Pine Beetle. The integrity and functionality of the collection system facilities are threatened by the potential consequences of the beetle infestation. Such consequences include the higher risk of catastrophic wildfires and resulting watershed erosion and sediment deposition. The water quality of this valuable supply is already being adversely impacted as a result of the infestation.

A diagram of the C-BT Project's integrated collection system is shown on Attachment 3. The collection system consists of: Shadow Mountain and Lake Granby reservoirs and Grand Lake all within the Colorado River Basin; and Willow Creek Reservoir within the Willow Creek drainage, which is a tributary to the Colorado River. The collection system utilizes two large pumping plants to move water between facilities. The Willow Creek Pumping Plant pumps water stored and released from Willow Creek Reservoir into Lake Granby Reservoir. The Farr Pumping Plant pumps water stored in Lake Granby Reservoir into Shadow Mountain Reservoir so it can then flow by gravity through Shadow Mountain Reservoir, into and through Grand Lake, to the intake of the Adams Tunnel. Water then flows by gravity from Grand Lake through the 13.1-mile long Adams Tunnel beneath the Continental Divide to the eastern slope, where water continues to be conveyed through C-BT Project facilities, ultimately being delivered to C-BT Project allottees and beneficiaries within the boundaries of Northern Water for beneficial use.

MUNICIPAL SUBDISTRICT AND THE WINDY GAP PROJECT

In 1970, the Municipal Subdistrict of the Northern Colorado Water Conservancy District (Municipal Subdistrict) was formed by a decree of the Weld County District Court and included six municipal water purveyors within northeastern Colorado. The purpose of the Municipal Subdistrict is the development and operation of the Windy Gap Project. The Windy Gap Project was constructed on the Colorado River approximately 1 mile west of the Town of Granby from 1981 to 1985 (location noted on Attachment 1).

The Windy Gap Project consists of a 415 acre-foot reservoir and a pumping plant that pumps water captured by the reservoir into Lake Granby Reservoir. Excess capacity in the C-BT Project, when available, is then used to convey the Windy Gap Project water to Windy Gap Project participants on the eastern slope. The average annual yield of the Windy Gap Project is approximately 48,000 acre feet.

Water yielded by the Windy Gap Project is from the 313 square mile drainage area of the Fraser River Basin. This watershed has also been severely infested by the Pine Beetle.

FORESTED WATERSHEDS

The drainage areas tributary to both the C-BT Project and the Windy Gap Project are heavily forested by predominately uniform-age, high-density, lodgepole pine. Nearly the entire drainage area tributary to the C-BT Project is federally owned and under the jurisdiction of the United States Forest Service or the National Park Service. Lands controlled by the National Park Service are limited to Rocky Mountain National Park. In 2009, Congress passed legislation designating most all of Rocky Mountain National Park as Wilderness. The drainage area tributary to the Windy Gap Project has a higher percentage of private ownership with the federally-owned lands being under the jurisdiction of the United States Forest Service.

PINE BEETLE INFESTATION IN THE UPPER COLORADO RIVER BASIN

In the early 1990's, initial evidence of Pine Beetle infestation was noted in the Upper Colorado River Basin, including the drainage areas tributary to the both the C-BT and Windy Gap projects. Over the next several years, the infestation would reach epidemic proportions, encompassing a majority of the forested areas in the Upper Colorado River Basin. Attachment 4 is a map indicating the extent of the Pine Beetle infestation in the drainage areas tributary to these two projects. It is important to note that to-date over 50% of the respective drainage area tributary to either the C-BT Project or the Windy Gap Project are infected by the Pine Beetle. The area infected continues to grow with many experts estimating that eventually over 90% of the lodgepole pine within the respective drainage basins will be infected by the Pine Beetle. Attachment 5 is an aerial photograph of the Grand Lake, Shadow Mountain, Lake Granby area showing the reddish-colored areas infected by the Pine Beetle.

Pine Beetle infestation poses significant, immediate, and continuing threats to the forest and the water supply originating as run-off from the affected forested areas. Trees killed by Pine Beetles are initially identified by their reddish color. The red needles provide a dry, highly combustible fuel load, dramatically increasing both the possibility and severity of wildfires. Although fire is needed to regenerate forest growth in lodgepole pine forests, uncontrolled wildfires in old, dense, uniform-age forests are not only highly destructive to the forest and its environment, but are also devastating to the water supplies that originate on those forests.

Addressing the threat of wildfire, as well as other water quality and water supply challenges caused by the Pine Beetle epidemic, is a daunting task in light of the millions of acres of land affected and the high cost of implementing adequate and effective measures. However, the cost of dealing with the aftermath of a wildfire may be magnitudes greater than the cost of proactive preventive measures.

The Buffalo Creek Fire in 1996 and the Hayman Fire in 2002 within the upper South Platte River Basin, although not occurring on Pine Beetle infested forests, are outstanding examples of the devastation that wildfires can cause to water supplies and water supply infrastructure. The Buffalo Creek Fire, a relatively small fire, cost the Denver Water Department (Denver Water) approximately $20 million to protect and restore water supply facilities, including the dredging of a reservoir to remove debris and sediment deposited from the erosion of the watershed following the fire. Significant expenditures were also required to address issues associated with the substantial deterioration in water quality caused by the fire. The adverse effects of that fire on Denver Water's supplies are still being felt. The Hayman Fire burned over 138,000 acres and resulted in costs of over $6.5 million just to protect Denver Water's Cheesman Reservoir in the two years immediately following that fire. The monies expended on Cheesman Reservoir are only a fraction of the total costs incurred by Denver Water because of this fire. Denver Water continues today to deal with the adverse effects of the Hayman Fire.

The debris, sediment, and nutrient loading that are captured by water facilities following a wildfire have the potential to reduce, significantly impact, or even destroy the functionality of those facilities. The resulting adverse effects on water quality are very detrimental and, depending on the characteristics of the watershed, can last for years or even decades. Remediation of the effects of wildfire for facilities associated with the C-BT Project or the Windy Gap Project could easily cost several million dollars for each facility.

If the reddish and dead Pine Beetle-infected trees are not the victim of wildfires, those trees will eventually lose their needles, with a commensurate decrease in the risk of wildfire. In some cases, the decrease in the forest canopy area will result in an increase in run-off from the affected areas, resulting in a benefit for water users. The increase duff on the forest floor resulting from the falling needles and the associated vegetative decaying process may result in higher nutrient loading in the run-off from the previously forested area. This increase in nutrient loading can cause several issues for water supplies including, but not limited to, causing increased growth of algae in the water supply, significantly decreased overall water quality, and greater challenges in treating the water without introducing threats to public health, such as disinfection by-products. Treatment of affected water supplies to drinking water standards may, in some cases, require costly modifications to water treatment facilities.

As these trees continue to deteriorate, they will eventually fall, posing threats to the safety of those in the affected areas. Over time, with increasing deadfall on the forest floor, the threat of wildfire and the associated problems again increases.

Northern Water and Municipal Subdistrict Experiences

Over 700,000 people in northeastern Colorado depend on C-BT Project and Windy Gap Project water as a source of their drinking water supply. The effects of a wildfire resulting from the Pine Beetle infestation within the two projects' watersheds would be devastating to the quality, quantity, and reliability of this water supply.

As the drainage areas tributary to the C-BT Project became more heavily infected by the Pine Beetle, Northern Water became increasingly concerned about the possibility and the consequences of a wildfire. In 2006, Northern Water contracted with the United States Geological Survey (USGS) to perform a pre-wildfire study to determine the potential for post-wildfire debris flows within the C-BT Project watershed. The purpose of the study was to estimate the probability of post-wildfire debris flows and to estimate the volume of debris flows that might occur. The results were alarming as the study showed significant adverse consequences to the C-BT Project and its water supplies as the result of a wildfire.

In July 2007 the Pinchot Institute for Conservation released a report entitled, "Protecting Front Range Forest Watersheds from High-Severity Wildfires." In an outreach effort, the Colorado State Forest Service and the U.S. Forest Service hosted a meeting with water providers to discuss potential methods to protect Front Range watersheds and their associated produced water supplies from the devastation of wildfires.

Over the next two years, this group would develop methodologies that would be used to evaluate the vulnerability of a watershed to wildfires and the consequences that might result based on the watershed's physical characteristics. Characteristics evaluated include wildfire hazard ratings, watershed steepness or ruggedness, soil erodibility, and water use ranking. These evaluations could then be used to prioritize those watersheds most threatened by wildfire and most needing remedial action to reduce the wildfire risk and the consequences of a wildfire. Preliminary results from the study of Colorado Front Range watersheds have recently been made available. Those

study results show: more than 2 million acres are classified as high hazard for wildfire; all major water collection, storage, and conveyance structures are threatened; the current measures being pursued to address the wildfire threat are inadequate; and adequate corrective actions in the form of forest treatments will require considerable increases in funding.

Based on the methodology developed for the evaluation of wildfire risk and prioritization of watershed protection, Denver Water, Northern Water, the Municipal Subdistrict, and other water providers engaged a consultant to evaluate the watersheds in the Upper Colorado River Basin. Watersheds evaluated included those tributary to the C-BT Project, the Windy Gap Project, and facilities owned and operated by Denver Water in the Colorado River, Fraser River, and Williams Fork River basins. Those preliminary results have very recently been released, pointing to the need for remedial measures to protect several vulnerable watersheds.

FUTURE ACTIONS TO ADDRESS PINE BEETLE-CAUSED THREATS TO WATERSHEDS

The Pine Beetle epidemic in Colorado has affected critical watersheds throughout Colorado, raising the risk of wildfires and the risk of the resulting devastating impact to watershed health and to the quality of the water supplies produced. It is important to note that on most infected watersheds where fires have thankfully not occurred and the infected trees have lost their needles, the wildfire threat has, as a result, been significantly reduced. However, the decaying needles on the forest floor are causing, and will continue to cause, adverse water quality effects. The cooperative efforts in Colorado to address the wildfire risks, led by the Colorado State Forest Service and the U.S. Forest Service, must continue with the timely and focused implementation of corrective or remedial measures necessary to address this real threat to water supplies. Scientifically based procedures have been developed to evaluate the threats posed to watersheds and prioritize those watersheds needing immediate remedial action to address the wildfire threat. The following steps are recommended:

- Prioritize watersheds based on risk for wildfire and consequences that may be caused by wildfire. This prioritization can then be used to allocate resources needed to address the wildfire risk in a region.

- Implement appropriate forest management practices to reduce the potential for wildfires. This would include such things as forest thinning, timber harvesting, fuel breaks to prevent the uncontrolled spread of wildfire, prescribed and controlled burning, and the natural use of fire.

- Develop and implement a plan to mitigate the adverse effects of post-wildfire impacts. This could include such things as construction of debris control dams upstream of reservoirs to limit debris flow into the reservoir or emergency action plans to limit erosion within the affected watershed.

- Develop the equivalent of Community Wildfire Protection Programs for the protection and restoration of critical water supply facilities within affected watersheds.

- Develop pre-event permitting processes for emergency corrective measures that would be necessary to implement a Community Wildfire Protection Program or an emergency action plan during and following a wildfire. This would allow the implementation of emergency mitigation measures in a timely, effective, and efficient manner.

- Develop federal funding mechanisms necessary to address and mitigate the threat posed by catastrophic wildfires resulting from the Pine Beetle infestation. Federal agencies should establish an emergency fund that could be utilized to pay for remediation of watersheds, water supplies, and water supply infrastructure during and following a wildfire. These funds would be available for protecting water quality and restoring the functionality of water supply facilities.

Conclusion

Addressing the threat of wildfire, as well as other water quality and water supply challenges caused by the Pine Beetle epidemic, is a daunting task in light of the millions of acres of land affected and the cost of implementing adequate and effective measures. However, the cost of dealing with the aftermath of a wildfire may be magnitudes greater than the cost of proactive preventive measures.

We must learn from our experiences and initiate long-term forest management practices that will lessen the future probability of Pine Beetle infestation and that will reduce the likelihood of catastrophic wildfire in the next generation of forest growth that will follow this Pine Beetle epidemic.

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LIST OF ATTACHMENTS TO WRITTEN TESTIMONY

ATTACHMENT 1	Map of the Northern Colorado Water Conservancy District and Colorado-Big Thompson Project
ATTACHMENT 2	Background and History of the Northern Colorado Water Conservancy District and the Colorado-Big Thompson Project
ATTACHMENT 3	Schematic Diagram of the West Slope Collection System of the Colorado-Big Thompson Project
ATTACHMENT 4	Colorado-Big Thompson Project and Windy Gap Project - Drainage Basins Affected by Beetle Infestation
ATTACHMENT 5	Aerial Photograph of Colorado-Big Thompson Project Drainage Basin

Attachment 2

Background and History of the Northern Colorado Water Conservancy District and the Colorado-Big Thompson Project

Background

Colorado presents unique challenges in regard to its available water resources and the demand for those water resources. Approximately 80 percent of the naturally occurring water supplies within Colorado fall on the western slope of Colorado, west of the Continental Divide. However, approximately 80 percent of the state's population and irrigable farmland are on the eastern slope of Colorado, east of the Continental Divide. Thus, Colorado faces a unique challenge of trying to match available water resources to existing and future rapidly growing water demands.

Because of the water short nature of the water supply within the South Platte River basin, water users within the basin began to investigate the possibility of conveying water from the headwaters of the Colorado River and the North Platte River Basin into the South Platte River Basin as early as 1890. In fact, the first effort for such a transbasin diversion began in 1895 with the construction of the Skyline Ditch and diversion of water from the Laramie River, a tributary to the North Platte River, into the Cache la Poudre River Basin, the largest tributary to the South Platte River. The following year, construction of the Grand River Ditch began, diverting water from the headwaters of the Colorado River again into a tributary of the Cache la Poudre River.

Development of Colorado-Big Thompson Project

In 1933, Northeastern Colorado was suffering from an extended drought, prompting water users to form an entity called the Northern Colorado Water Users Association to renew and intensify the efforts to find additional supplemental water supplies. Again, the attention focused on the headwaters of the Colorado River and the "Grand Lake Project," a project concept developed by visionaries in previous decades. This concept included diverting water from the headwaters of the Colorado River at Grand Lake, the largest natural lake in Colorado, taking the water beneath the Continental Divide, into the drainage basin of either the Big Thompson River or St. Vrain Creek on the eastern slope. The efforts were expanded to include discussions with several federal agencies, including the United States Bureau of Reclamation (Reclamation). Over the next four years, the concept of the Grand Lake Project transformed into the development of plans by Reclamation for the Colorado-Big Thompson Project (C-BT Project). In 1937, the engineering report which summarized the design and operation of the proposed C-BT Project prepared by Reclamation was presented to Congress. This document, known as Senate Document 80, lives on today as portions of this document continue to govern the operation of the C-BT Project.

Creation of the Northern Colorado Water Conservancy District

In May, 1937, the Colorado State Legislature passed legislation providing for the creation of water conservancy districts. The Northern Colorado Water Conservancy District (Northern Water) was the first conservancy district created in Colorado under this statute, being created in

September, 1937, by decree of the Weld County District Court. On July 5, 1938, Northern Water and Reclamation entered into a contract containing the terms and conditions that defined the contractual relationship between Northern Water and Reclamation for the design, construction, operation, maintenance, and administration of the C-BT Project.

Colorado-Big Thompson Project Configuration and Operation

The C-BT Project's collection system on the western slope of Colorado, including Lake Granby, Shadow Mountain, and Willow Creek reservoirs and Grand Lake, captures, stores, and diverts water from the headwaters of the Colorado River, diverting that water through the 13.1 mile long Alva B. Adams Tunnel beneath the Continental Divide, to Colorado's eastern slope. After flowing through the project's power plants and generating power, the water is then conveyed into the C-BT Project's distribution system comprised of Horsetooth Reservoir, Carter Lake Reservoir and a total of 92 miles of distribution canals. The water is then made available to project beneficiaries for irrigation, municipal, domestic, and industrial uses within the boundaries of Northern Water. The C-BT Project's supplementary water supply complements the already-existing developed water supplies within the area included within the boundaries of Northern Water.

The C-BT Project as originally designed was envisioned to deliver a net average annual yield to project beneficiaries of approximately 310,000 acre feet of water. This estimate of average annual yield was based on very optimistic hydrology. Time and experience has shown that the actual yield of the project is approximately 220,000 acre feet of water per year as diverted at the headwaters of the Colorado River. The C-BT Project remains the largest single transmountain diversion in the State of Colorado.

A unique feature of the C-BT Project is Green Mountain Reservoir located on the Blue River, a tributary to the Colorado River. Green Mountain Reservoir was built both to enhance the function of the Collection System of the C-BT Project and to provide mitigation to the western slope for the impacts the diversion of water from the headwaters of the Colorado River by the C-BT Project would have on existing and future water users within the Colorado River basin in Colorado. Green Mountain Reservoir, an integral part of the C-BT Project, has proven itself to be very valuable both to the eastern slope beneficiaries of the C-BT Project, and to water users on the mainstem of the Colorado River within Colorado. Since being put into operation in 1943, the operation of Green Mountain Reservoir and the beneficial use of the water it provides to the western slope has evolved to meet ever-changing and increasing water demands brought about by the growth in western Colorado.

The C-BT Project was designed, constructed, and is operated and maintained primarily as a water supply project. However, the C-BT Project was also authorized as a power generation project. The C-BT Project's six power plants provide needed project power for the C-BT Project's three pumping stations, as well as providing power marketed by the Department of Energy through the Western Area Power Administration. Operating principles of the project require that water moved through the project for water supply be done so primarily to meet the water demands placed on the project, but secondarily done in a manner that maximizes power generated by the C-BT Project. The effective and efficient operation of the C-BT Project's power

plants provide a reliable and flexible source of renewable energy, again a benefit from the C-BT Project that is essential to the area's great and growing economy.

As the area served by the C-BT Project has evolved and grown, the demands placed on the project have likewise changed. Construction on the project began in 1938, but final completion of this complex project did not occur until 1957 when the project went into full operation. At the time the project was placed into full operation, 85 percent of the water allocated from the C-BT Project by Northern Water was owned by agricultural interests, while 15 percent of the C-BT Project's water was owned by municipal, domestic, and industrial interests. The first year of operation resulted in approximately 95 percent of the water delivered by the C-BT Project being used for agricultural purposes, while 5 percent of the water delivered was used for municipal and industrial purposes. Over time, ownership of allotment contracts associated with the project has changed to reflect changing demands of the region. Currently, 64 percent of the water allocated from the project through allotment contracts is owned by municipal and industrial interests, while 36 percent of the water allocated remains in the ownership of agricultural interests. Usage of C-BT Project water over the last several years has averaged approximately 60% of the water delivered being used for agricultural purposes, while 40% of the water delivered is utilized for municipal and industrial use.

The changes in ownership of C-BT Project water allotment contracts can be attributed to Northern Water's free market system for the transfer of allotment contracts between entities on a willing-buyer/willing-seller basis with the approval of the Boards of Directors of Northern Water. The difference between ownership and actual water usage can be attributed to the robust rental market system incorporated by the Boards of Directors into the initial operation of the project, allowing water not needed by a particular allottee to be rented or leased to another water user within the Northern Water boundaries that is in need of supplemental water supplies.

Future Water Supply Challenges

Northern Water and its constituents face significant challenges in the management of available water resources. Northern Water has studied existing land use plans developed by the cities, towns, and counties within its boundaries along Colorado's northern front range within Larimer, Weld, and Boulder Counties. This study indicates that to supply the water needs indicated by those land use plans and the associated growth and development, another approximately 300,000 acre feet of water will be needed for municipal, domestic, and industrial purposes. This required future supply is significantly greater than the 220,000 acre foot average annual yield of the entire C-BT Project.
To meet only a portion of that need, the NCWCD is involved in the planning and development of a number of projects. The most notable of these include the Northern Integrated Supply Project (NISP) and the Windy Gap Firming Project. Both of these projects are now working their way through the National Environmental Policy Act (NEPA) compliance, with each having concluded the public review process of each project's respective draft Environmental Impact Statement (EIS).

The NISP project is a complex project that consists of a 180,000 acre foot reservoir and a 40,000 acre foot reservoir that are coupled with a complex array of water exchanges that will yield

approximately 40,000 acre feet of additional firm yield on an annual basis. The project cost is approximately $426 million. The Windy Gap Firming Project, as proposed, would consist of a 90,000 acre foot reservoir that would be used to store water diverted by the Windy Gap Project. The Windy Gap Project is owned and operated by the Municipal Subdistrict of the Northern Colorado Water Conservancy District. It is also a transmountain diversion project. The Windy Gap Project diverts water from the Colorado River downstream of the C-BT Project and utilizes the excess capacity in the C-BT Project to convey the Windy Gap Project water to the Windy Gap Project participants on the eastern slope. The cost of the Windy Gap Firming Project is estimated to be $250 million.

The benefits of these proposed new water projects can be maximized if these proposed projects are allowed to work in concert with the C-BT Project. The integration of these projects is imperative if the region is to meet its future water supply needs.