COLORADO PARKS & WILDLIFE

The Cost of Invasion

ZEBRA AND QUAGGA MUSSELS

Industrial Facilities

- $1.4 million for removal of zebra mussels from 400 cubic yards from one Lake Michigan paper company plant in 1997.[1]
- 142 industrial facilities in the Great Lakes, direct operating cost: monitoring and control of zebra mussels $149 million spent between 1989–1994. [9]
- Industry: intake pipes, water filtration equipment, and power plants operating costs for zebra mussel damages $3.1 billion dollars spent over 10 years.[8]
- $200 million annually in the Great Lakes region to raw water users, commercial and sport fishing due to zebra mussels.[15]

Water Treatment

- The Metropolitan Water District has spent $30 million over the last five years to fight the quagga and might be spending $8 million to $10 million a year on it into the unfathomable future.[2]
- Metropolitan Water District of Southern California receives approximately 740,000–800,000 acre-feet of water per year from the Colorado River and will spend $10–15 million annually in operations and maintenance costs to address quagga mussel infestation in its Colorado River Aqueduct and terminal reservoirs.[3]

ZEBRA MUSSELS

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- "The annual cost to the Southern Nevada Water Authority is about $200,000. But, Lew said, that doesn't include additional construction costs for chemical structures that are upwards of $8 million."[4]
- Great Lakes water users with intake structures monitoring and control of zebra mussels $30 million in 1992–1994, and $120 million in 1989–1994.[13]
- U.S. and Canada water users total economic costs for zebra mussels at $5 billion for 2000–2010.[5]
- Municipal Water Treatment in the Great Lakes, monitoring and control of zebra mussels $84,000–$154,000 in 1993, per plant.[13]
- $172,600 annually for chlorination additions at Southern Nevada Water Authority: removal of quaggas from one drinking water intake tunnel $340,000: routine maintenance and removal $6,000: proposed chemical control $560,000: research on the invasion $300,000.[14]
- Wichita City water department—$1.6 million copper ion system at the Cheney Pump Station. 2010.[6]
- $400,000–$450,000 per year for municipal water treatment facility in Windsor.[8]
- Buffalo, New York Water Board has signed a $396,000 contract with Buffalo Industrial Diving Co. to remove an underwater graveyard of mussel shells that has been expanding since the early 1990s. The pile of dead shells, 12 feet long by about 10 feet wide, is 8 feet high in one spot.[7]

Power Generation

- Total estimated costs for invasive mussels in the Eastern United States, including ecological damage, range from $100 to $500 million per year. The cost to water conveyance, water treatment, and the power industry has been estimated at $100 million per year, limited to the Eastern United States. Approximately 1,800 water systems rely on surface water from rivers and lakes west of the 100° Meridian, serving 47.5 million people.[8]

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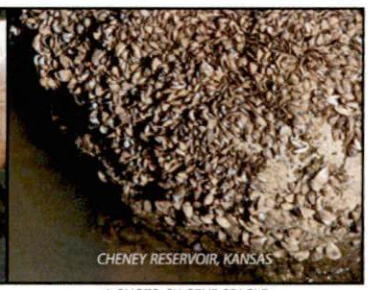

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- Wisconsin Power Plants/water utilities- maintenance ZQM $250,000–$500,000 per plant/yr in 2001.[9]
- Great Lakes Power Plants (46 power plants) direct operating cost for zebra mussels, costs to power plants range from $6,700 per hour for a 200-megawatt system to $127 million annually for U.S. Great Lakes power plants year 1993.[9] Great Lakes Power Plants (46 power plants) re-design (damages) zebra mussels $800 million year 1993.[3]
- Throughout 35 U.S. states and three Canadian provinces surveyed in the Great Lakes Region, 339 facilities reported expenses relating to zebra mussel impacts totaling $83 million in 1989–1995.[10]
- If zebra and quagga mussels invade the Columbia River, they could cost hydroelectric facilities alone up to $250–300 million annually. This does not include costs associated with environmental damages or increased operating expenses to hatcheries and water diversions.[11]
- Oregon projected zebra mussel control costs to 13 hydropower facilities $25.5 million.[12]
- $150,000 per generator in mitigation strategies with annual maintenance of $100,000 is the estimated costs to hydroelectric plants for mussel infestation.[13]
- $1 million per year Hoover Dam annual budget for quagga mussel control.[13]
- An estimated cost for zebra mussel mitigation at a nuclear facility, based on the Entergy owned facility in Oswego NY, is $467,390, plus annual operating costs of $109,058.[15]
- David Michaud, principal environmental scientist for Wisconsin Electric Power Co: In 1993, the company, which operates six power plants that use Great Lakes water, one of which is in Michigan's Upper Peninsula, spent $1 million on maintenance alone from zebra mussels, Michaud said.[14]
- Ontario Power Generation capital costs (in 1990 U.S. dollars) for installation of a NaOCl system were $403,000 for Sir Adam Beck (SAB) #1 (470 mw, 10 generators), and $805,088 for Sir Adam Beck (SAB) #2 (1290 mw, 16 generators). OPG's annual costs for maintaining this system include three technicians at $65 an hour for four weeks (160 hours) which equals $31,200.[15]
- The mussels clog the utility's two massive water intake pipelines, and if not routinely treated, they could disrupt the flow of 390 million gallons of water a day to the Las Vegas area, Zegers said. The water system spends about $1 million a year to manage the problem.[8]
- Hydro-electric plant direct operating costs for ZM $92,000/plant/yr.[9]
- Fossil-Fuel Plant direct operating costs for ZM $160,000/plant/yr.[9]

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