<table>
<thead>
<tr>
<th>East Slope of Rocky Mountains in northeastern Colorado</th>
<th>1.6 million acres (652,000 ha) in eight counties</th>
</tr>
</thead>
</table>

Contracting entity for repayment of irrigation component of Colorado – Big Thompson (C-BT) Project
## Colorado – Big Thompson Project

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>$160 million construction cost</td>
<td></td>
</tr>
<tr>
<td>12 reservoirs/lakes</td>
<td></td>
</tr>
<tr>
<td>3 pumping plants</td>
<td></td>
</tr>
<tr>
<td>7 hydro-electric power plants</td>
<td></td>
</tr>
<tr>
<td>99 miles (160 km) of canals</td>
<td></td>
</tr>
<tr>
<td>693,000 irrigated acres (280,000 ha)</td>
<td></td>
</tr>
<tr>
<td>220,000 ac-ft (270 m³ x 10⁶) average annual deliveries</td>
<td></td>
</tr>
<tr>
<td>$370 million/year agricultural production</td>
<td></td>
</tr>
<tr>
<td>721,000 population</td>
<td></td>
</tr>
</tbody>
</table>
Northern Water’s Weather Station Network

Mark Crookston
June Caves
Tim Lynch
Mary Hattendorf
Weather Station Network

- Provides weather & crop water use information throughout Northern Water’s service area
- 24 automated stations – 4 owned by cooperators
- Solar powered
- Cellular phone telemetry – CDMA modems
- Station sites ‘carefully’ selected – in alfalfa fields or large turf areas
- Air temperature, relative humidity, rain/precipitation, wind speed/direction, solar radiation & soil temperature
- Every sensor serviced & calibrated at least annually
Provides crop water use information for northeastern Colorado
ASCE Standardized Penman-Monteith equation

Daily calculations at present, both ETr for alfalfa and ETo for turf grass

Hourly calculations planned to be implemented in 2010

Excellent comparison to 4 (four) turf grass automated lysimeters at old Loveland headquarters

ETr is factored using coefficients based on crop growth stages for all major crops grown in the area
Costs?

• Station density: every 10 miles
  (one station per 100 square miles)
• Purchase cost: $5,600/station
• Expected life: 8 years → $700/station/year
• Maintenance: $2,300/station/year
• Communications: $200/station/year
• Average annual cost: $0.05/acre/year
Where’s the Data?

**Internet**
- [www.northernwater.org](http://www.northernwater.org) weather, ET & maps
- [www.coloradoet.org](http://www.coloradoet.org)
- [http://ccc.atmos.colostate.edu/~coagmet/](http://ccc.atmos.colostate.edu/~coagmet/)

**Call Center**
- 970-593-1605 local
- 888-662-6426 (NoCoH2O) toll-free
www.northernwater.org

Weather

Weather stations & data/reports

Click on location for latest data
Sensor Calibration

Every sensor checked & calibrated every year

- Air Temperature
- Relative Humidity
- Rain – tipping bucket gauge
- Precipitation – weighing bucket gauge
- Wind Speed
- Wind Direction
- Solar Radiation
- Soil Temperature
Air Temperature & Soil Temperature

Vaisala HMP45C
CSI 107 Probe

Revere load cell weighing buckets also calibrated for temperature correction
Relative Humidity

Vaisala HMP35C & Vaisala HMP45C
Tipping Bucket Rain Gauge

Texas Electronics TE-525 w/ variety of collector sizes
Weighing Bucket
Precipitation Gauge

Revere load cell gauges fabricated in-house

Belfort w/ 12-inch capacity
Wind Speed & Wind Direction

RM Young 05103
Solar Radiation

Li-Cor pyranometer LI-200
Northern Water Weather Station Network

20 – Northern Water
2 – City of Boulder (maintained by Northern Water)
1 – Poudre R1 School District (self installed & maintained)
1 – Aqua Engineering (self installed & maintained)
Fort Collins – Poudre High
Owned & operated by Poudre R1 School District
Fort Collins – Central
Roland Moore Park
Fort Collins – East
CSU Horticulture Research Center
Loveland

Loveland Municipal Olde Golf Course
Johnson’s Corner
Berthoud
Northern Water Headquarters
Longmont – West
Longmont Parks & Recreation
Longmont – South

Damaged by horses
Boulder – Northwest
Boulder Parks & Recreation
Boulder – Flatirons Golf Course
Boulder – East
City of Boulder
Boulder – Southwest
Eaton

Re-located 10-Mar-10
Greeley – West
Greeley Parks & Recreation
Fort Lupton
Coyote Creek Golf Course
Wiggins
Fort Morgan
Municipal Golf Course
Brush
Sterling
Crook
Ovid
Windy Gap
7,851 ft above MSL

Winter

Summer
Questions?

Northern Water
Northern Colorado Water Conservancy District