April, 2009

CLARION

A Publication of the Colorado Lake and Reservoir Management Association

I'm puzzled – here it is April and it's snowing outside again. Typical Colorado spring weather when it is dry and sunny one week (hour, day, etc.) and snowing the next! As is also typical, this issue of the Clarion has been delayed and therefore the information about the Spring Conference is not timely. I hope that many CLRMA members are attending the conference and enjoying the great line-up of speakers and topics put together by Elizabeth Brown, the new Conference Committee Chair for our organization.

In this issue of the Clarion you will find articles on climate change in the west (Ripples) and Dillon Reservoir (Reflections), President's Dock, Ask the Lakes-pert, a Volunteer Monitoring announcement and our Spotlight feature this time will be Kelly DiNatale. Long-time CLRMA members know that Kelly was the first CLRMA President and was the lead for establishing the organization back in 1996 as a Chapter of the then parent organization – the North American Lake Management Society. Kelly has changed jobs a few times and now has his own business, but continues to be active, both at the national and the local level in lake management.

CLRMA plans to have several events in 2009 beginning with the Spring Conference on April 21, 2009 at the City of Thornton Margaret Carpenter Recreation Center, 11151 Colorado Blvd., from 11 am – 4 pm. Topics for the conference include nutrients, reservoir drawdown, aeration, invasive species, Lakes Appreciation Month historical activities, new reservoir projects, water clarity standards, a FlowCam demonstration and a photo tour of Thornton pond.

This summer CLRMA will sponsor a Lakes Appreciation Month activity, on Ridgeway Reservoir in Western Colorado. The tentative date is July 18th and will include free fly fishing (by day) and astronomy lessons (by night). Another Rockies Game and Awards Banquet is planned in September and the Joint Watershed Conference co-chaired this year by CLRMA will take place in Vail in early October. Please check the CLRMA website as these dates get closer during the year!

CLRMA is planning to re-vamp the website to update the appearance and add more functionality. We apologize to the members for a delay in updating the information on the website this month. Our webmaster's computer crashed and he needs new hardware to get it functioning again. We plan to get another CLRMA member certified to access the web page and perform time sensitive updates and changes in the near future. That will help to ensure that webpage information is kept up to date and that events announcements are available well before the event occurs!

CLRMA is looking for a new Clarion editor beginning with the January issue in 2010. If you have any comments or suggestions for the Clarion, are interested in becoming the Clarion editor, or feedback for the CLRMA website, please let me know – Sharon Campbell, campbells@usgs.gov, 970-226-9331.

Colorado Lake and Reservoir
Management Association
P.O. Box 9504
Denver, CO 80209

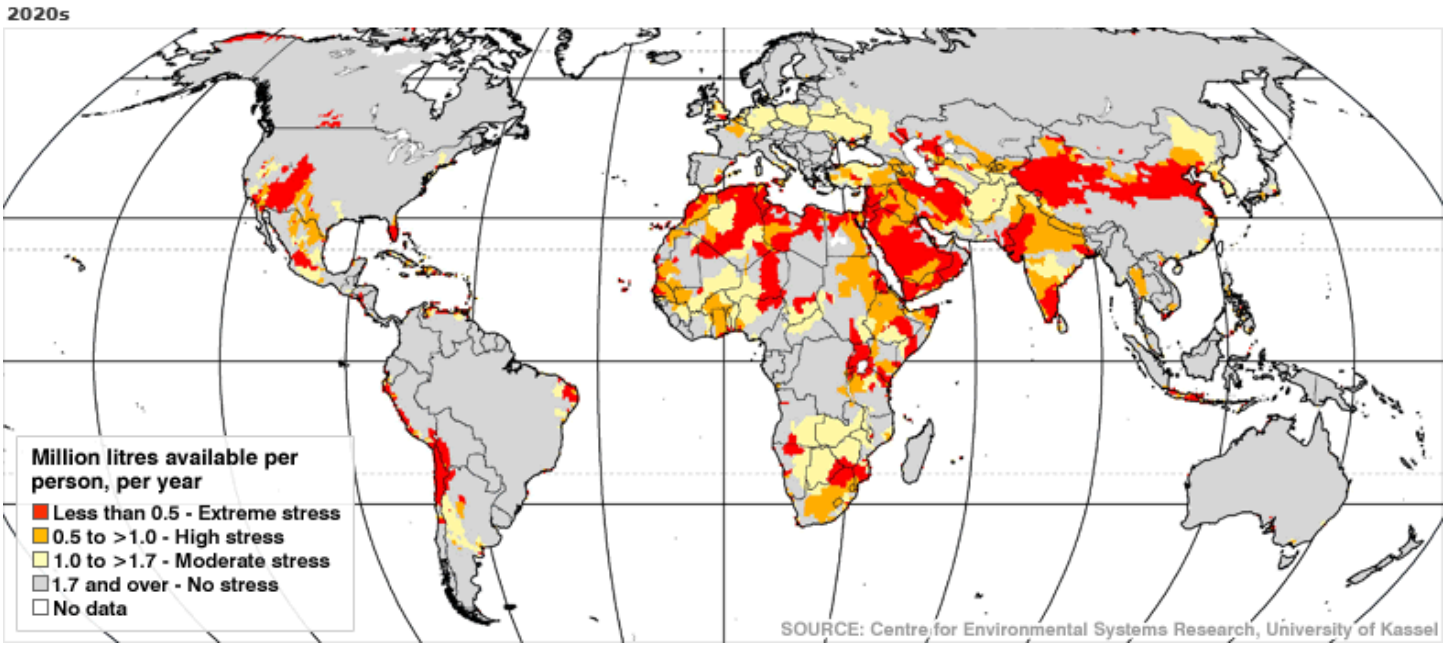
Ripples: The fight for water in North America

By Max Deveson
BBC News, Washington

The arid states of America's south-west have been getting drier in recent years.
Since 2000, the Colorado River - which provides water for seven US states in the region - has carried less water than at any time in recorded history.

And while the drought is worsening, the demand for water in this booming part of the country is increasing. The states dependent on the Colorado River for their water are seeking solutions to their water shortage, with some suggesting that importing water from far-flung states - or even towing icebergs down from the Arctic - could solve the problems. Meanwhile, the US states and Canadian provinces of the water-rich Great Lakes basin have drawn up an agreement to restrict the export of water from their region.

Experts say this pattern - of water shortages in dry regions, and protective agreements in wet areas - is likely to repeat itself elsewhere as the world demand for water begins to exceed supply.



Transporting water

The seven US states served by the Colorado River commissioned a study in 2006 to look into ways to augment their existing supply of water.

"The water levels that we considered normal flow just aren't going to exist anymore," said Pat Mulroy, chief executive of the Southern Nevada Water Authority.

The states asked consultants to consider the feasibility of 12 potential options, ranging from the large-scale re-use of household wastewater, to the importation of fresh water from further afield.

Importing water is not a new idea. For years, engineers and politicians have been coming up with proposals to transport water from water-rich northern California or Alaska down to the desert south-west. In the early 1970s, the US Bureau of Reclamation began looking into the idea of building an underwater aqueduct to carry water from northern California to the south of the state.

The feasibility studies were never completed, but in the 1990s, Alaska Governor Walter Hickel resurrected the idea of an ocean pipeline, this time to transport water from Alaska to the south-west US. Again, however, the plans were discarded.

The consultants acting for the seven Colorado River states also looked into the pipeline option, and concluded that such a project could potentially bring large quantities of water to the region.
The plan would pose serious technical difficulties, cost billions of dollars, and could threaten Alaska's fish population.

They also looked in to the possibility of shipping water down from the north-west, either in refitted oil tankers or specially-designed nylon bags that could be towed by tugboats.

Towing icebergs

Several companies have been formed in recent years promising to make water transportation a reality, according to the consultants' report. One such firm - Transglobal Trade - has signed long-term agreements with Native American groups in Alaska for bulk water rights, although it has yet to begin shipping it. And Global H20 Resources, a Canadian firm, has been granted rights to 4.8bn gallons of glacier water every year for 30 years by the Alaskan city of Sitka.

For years, engineers have dreamed of tapping into the freshwater resources of the Arctic, by towing icebergs from northern waters down to California. But such proposals have always foundered because of the impracticability of insulating the ice to prevent melting in transit.

Although the Colorado River states did consider some of these ambitious water importation schemes, their engineers concluded that projects closer to home - like water conservation, and desalination of ocean water - were more practical and realistic options. "I would describe some of the [water importation] options as 'brainstorming'," said Southern Nevada Water Authority spokesman Scott Huntley. "But that doesn't mean that one day water importation from further afield couldn't become a reality." "The Colorado river system will ultimately have to be augmented from somewhere," added Pat Mulroy. "But it's more feasible to divert floodwaters from the mid-west than to get water from Canada," she added.

'Awash in water'

During last year's presidential election campaign, one candidate for the Democratic Party nomination - New Mexico Governor Bill Richardson - called for a National Water Policy, noting that Great Lakes states like Wisconsin were "awash in water".

No official suggestions have been made for large-scale transfers of water from the Great Lakes basin to the parched south-west.
But that has not prevented the US states and two Canadian provinces that surround the lakes to draw up an agreement restricting the export of water from the region.

Chicago diverts 2bn gallons of water daily from the Great Lakes

The agreement - known as the Great Lakes-St Lawrence River Basin Water Resources Compact - bans any new diversion of water from the Great Lakes basin, though "limited exceptions could be allowed in communities near the Basin when rigorous standards are met".

Legally unstoppable

It is these "limited exceptions" that worry the Council of Canadians, which campaigns for sustainable water usage in Canada, and whose chairperson Maude Barlow advises the UN General Assembly's President on water issues.

The Council warns that by granting special rights to communities and counties straddling the Great Lakes, the compact will allow "vast amounts of water [to] be transferred outside the Great Lakes basin, which will have adverse effects on its ecological integrity and lead to further depletion of water in the basin".
"The Great Lakes are in trouble," Ms Barlow said. "People say there's plenty of water here - but that's what they said about the Aral Sea in Russia." Chicago already diverts 2bn gallons (7.5bn litres) of water every day from the Great Lakes basin, and the compact does little to prevent the city taking even more water.
Bottled water companies are also exempt from the agreement, which the Council says could lead to the unacceptable exploitation of Great Lakes.

"Once bottled water corporations are granted this right it will be difficult to regulate taking water out of the Great Lakes in containers because the practice would be protected in international trade agreements such as the North American Free Trade Agreement (Nafta)," it warns. The council fears that if water is designated as a commodity under Nafta, a precedent would be set, and large-scale export of Canadian water to the US would become legally unstoppable. "I doubt that the south-western US states will be looking to the Great Lakes for their water - but they may well look to parts of northern Canada," said Ms Barlow.

New administration

US President Barack Obama has emphasised the need to conserve water and notably did not include any big water projects in the stimulus package. This suggests that the incoming administration will not look kindly on any grand schemes to bring water to the parched south-west. Pat Mulroy agrees with this analysis. "There has to be a mosaic of solutions - but conservation and re-use should be at the forefront of any strategy", she told me.

> **“Prices and policies must be set in ways that give everyone a clear incentive to use water efficiently and avoid waste”**
>
> Barack Obama

The lesson may well be that to keep the water flowing in the desert, it makes little sense to tow icebergs down from the Arctic, or to divert water from the Great Lakes. But water there is should be conserved, re-used and treasured as the precious natural resource that it is.

Brown and Caldwell’s Climate Change: http://www.bcwaternews.com/NationalWaterNews/climatechange/

President's Dock – by Sarah Sauter

The fourth annual Sustaining Colorado Watersheds Conference starting to come together. The 2009 theme is "Thriving in Challenging Times". This year's lineup will feature more hands-on training, workshops and field trips than years past. New to our partnership with the Colorado Watershed Assembly, AWARE Colorado and the Colorado Riparian Association is the Colorado Foundation for Water Education.

If you can, please clear some space in your busy calendars to join us at the Vail Cascade Spa & Resort on October 7, 8 and 9. Early registration begins in June and more information can be found at www.coloradowater.org. We hope to see you there!

As is tradition, CLRMA has a number of events scheduled for the spring and summer. I hope that many of you attended the CLRMA spring luncheon in Thornton on April 21. Elizabeth Brown, CLRMA Secretary and Conference Chair, put together a great lineup. July is Lake Appreciation Month and CLRMA will be celebrating it at Ridgway Reservoir on July 18. We are partnering with State Parks, Trout Unlimited, DOW and the Uncompahgre Watershed Partnership. The day will include free fly-fishing lessons for kids, an astronomy lesson at night, volunteer opportunities and possibly even kayak rolling lessons. Bring your tent and come on over to the west slope for the weekend! CLRMA will also be assisting with a Lake Appreciation Day at Barr/Milton on July 18. For more information on either of these events, please check out our web page at www.clrma.org.

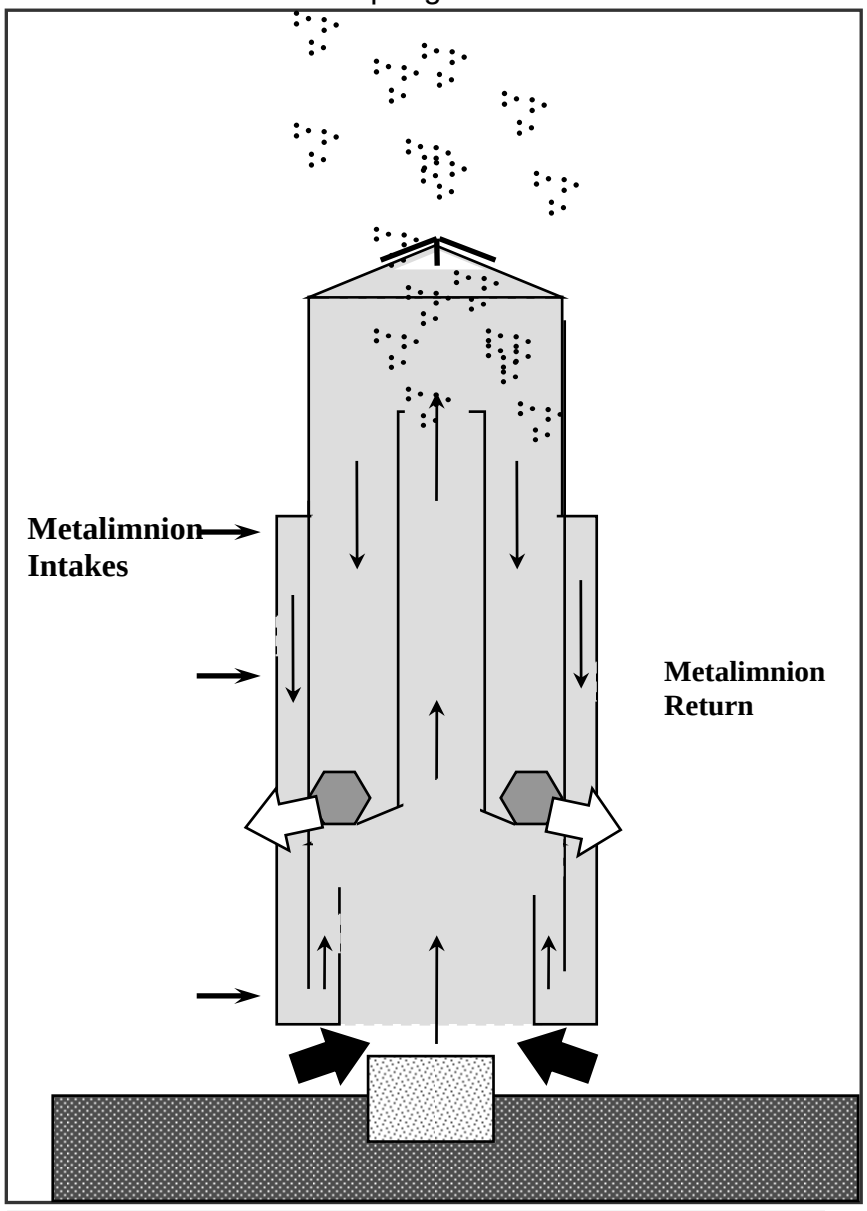


Figure 1. Schematic drawing of a layer aerator (Kortmann).

Ask the *Lakespert* by Steve Lundt

Q: Layer aeration, is this for lakes or is it some kind of new skin treatment for movie stars?

Thanks, Gulpin F. Heire (Will O Wisp, CO)

A: Layer aeration is definitely a technique for lakes and reservoirs, not skin treatment. Like all other lake aeration systems, layer aeration is a way to mix depleted oxygenated water with air bubbles to

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increase dissolved oxygen and help combat internal phosphorus loading. The oxygen in air (21%) goes from the gas phase into the dissolved liquid phase, thus oxygenating the water.

Layer aeration was invented and patented by Dr. Robert Kortmann in the early 1990's. The niche this type of aeration fills is being able to accurately aerate the metalimnion or other specific water depths that are important to aerate. This selective aeration technique uses compressed air and has no equipment on the lake surface.

Layer aeration is all made possible thanks to the wonderful, density properties of water at different temperatures. Water at a given depth in the metalimnion will have a given temperature. When aerated by a layer aeration system, the water is aerated and then returned to a similar depth due to maintaining a similar water temperature during the aeration process. The travel time through one of these layer aerators in on the order of minutes so little temperature is lost. When multiple intake doors are opened, then the blending of different water temperatures can create an isothermal metalimnion.

Here is a system breakdown of a layer aeration system. 1. Compressors: an air compressor is housed on shore that is well ventilated, 2. Air Lines: small, HDPE, weighted air lines going from the air compressor to the anchored and fully submerged aerator. 3. Aerators: aerators will be anchored at a set depth from the lake sediments so that the intake doors and return flows are at the right depths (Figure 1).

Like any other in-lake treatment tool, layer aeration has its advantages and disadvantages and must be applied in the right situations. Advantages include: no boating obstacles at the lake surface, does not destratify deeper lakes, more oxygen to support zooplankton and fish, liquid alum can be injected with the air to apply a bottom alum treatment, and there is plenty of flexibility when it comes to operating the system. Disadvantages include: could create upwelling of dissolved hypolimnetic phosphorus into the epilimnion, main reason why systems fail is that the rate of oxygen added to the lake does not equal the oxygen deficit rate, and the potential risk of saturating the water with N_2 aqueous gas and causing gas bubble disease in fish.

This particular technique is great in situations where the metalimnion is having low oxygen problems. Many times, lake managers focus on the hypolimnion and forget that the metalimnion might have just the same amount of sediment surface area for internal loading and it usually is where drinking water intakes are located (Figure 2). Layer aeration, when sized and installed correctly in the right setting, can significantly reduce internal loading and provide the needed lift to reduce a lake's trophic status.

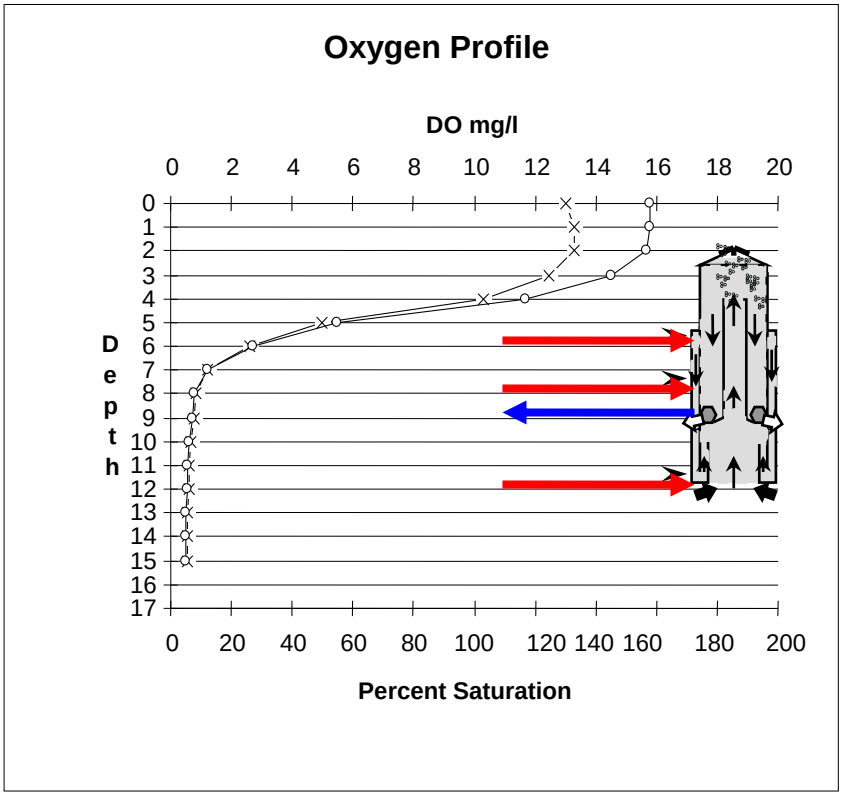

Figure 2. Example where a lake had a major oxygen problem through its hypolimnion and metalimnion, a layer aeration system was installed to aerate both the zones to curb substantial internal loading.

CVLM Program – Dust off those Secchi Disks again

This will be the 5th year for the Colorado Volunteer Lake Monitoring Program. Each year, more volunteers participate and more trips are made to measure water clarity. If all goes well, with big help from the Colorado Water Quality Division, we will be adding multi-parameter probes to the program and a few selected volunteers will be able to record complete water column profiles for temperature, dissolved oxygen, turbidity, and conductivity.

Please pass the word around and help recruit volunteers for this well established program. Thanks goes out to all those who have volunteered for the past 5 years, and CLRMA looks forward to working with you for another 5 more.

To sign up for a lake or reservoir, contact Steve Lundt at slundt@mwrd.dst.co.us.

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CLRMA Spotlight - Kelly DiNatale

Age: 55
Yrs w/ CLRMA/NALMS: 15 +/-
Yrs in CO: 32

What do you do: Started a new consulting firm – DiNatale Water Consultants, Inc. Water Resources Planning and Engineering – water supply, quality and treatment

Family: Spouse, Leigh and 2 children son, Peter 17 and daughter Emy, 14

When I'm not working I am… shuttling kids to events, gardening, fishing, running, hiking, working out reading the paper (Sunday NY Times takes all week) and just vegging out

Your idea of happiness: Fly fishing on a remote river in another country, catching and releasing some trophy sized fish

Not many people know that... we own llamas

What do I like to do most: Get some form of fun exercise

If I won the lottery: I'd split it between some family, charities and take some time for travel

Last book(s) I read: World War Z, Watchmen and Long Way Down – all very different

What political office: There's not one that's worth the headache, but the greatest impact can be achieved at the state and local level.

Toughest aspect of my job: meeting client expectations while maintaining work – home life balance

What famous person would you like to meet most: Socrates

Colorado Invasive Species - Protect Your Waters!

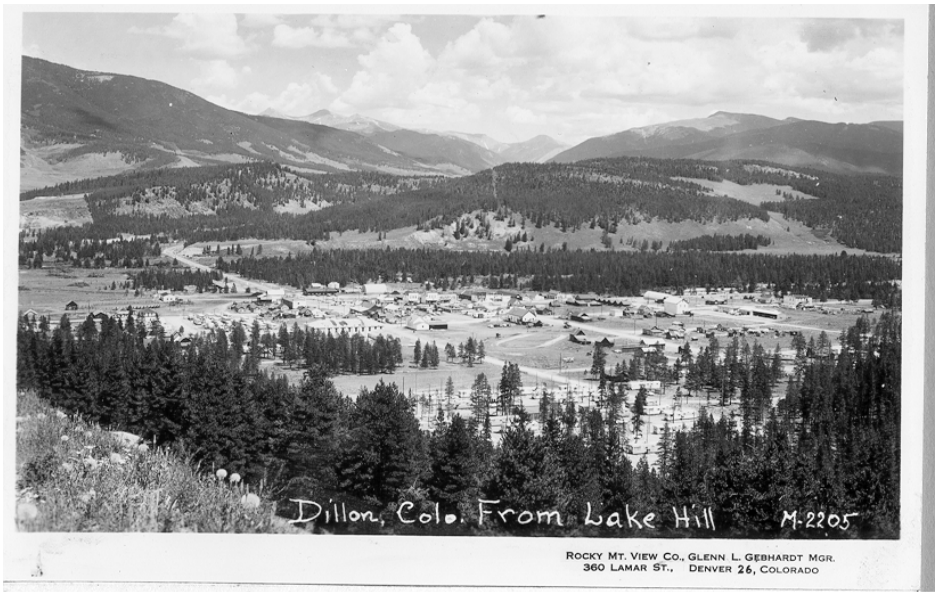
Colorado lakes and streams already have a variety of nuisance aquatic species, most of which originated elsewhere and are formally listed as invasive species. CLRMA Secretary Elizabeth Brown and Director at Large Kelly Cline are members of an Invasive Species Work Group in Colorado that are trying to establish protective measure for preventing the spread of zebra mussels. Here are a variety of web sites where you can find out more about nuisance aquatic species, how they are spread, and how to prevent further spreading of unwanted organisms.

http://nas.er.usgs.gov/taxgroup/mollusks/zebramussel/
http://www.epa.gov/Region8/water/didymosphenia/
http://www.protectyourwaters.net/hitchhikers/

Reflections: Dillon Reservoir by Ann Depperschmidt, Denver Water community relations

Just after Ron Sampson graduated from Idaho Springs High School in 1960, several of his friends spent a summer moving the Dillon Cemetery to higher ground.

They were helping Denver Water make way for a new reservoir, one that would eventually become one of Colorado's largest bodies of water.



This photo, taken before 1960, shows the town of Dillon before it was relocated to make way for Dillon Reservoir.

"I thought it was exciting," said Sampson, who now lives in Arizona. "It provided a lot of jobs." In the early part of the 20th century, it became clear that Denver's growing population would need more water supply than the South Platte River could provide. Officials started looking at West Slope water as a way to supplement East Slope water. In the 1950s, crews began building the Roberts Tunnel, a concrete-lined, 23-mile tunnel that could move water from the West Slope through the mountains to the East Slope.

As part of the tunnel project, Denver Water moved forward with plans to build Dillon Reservoir at the west portal of Roberts Tunnel. To do that, however, the water utility had to relocate the town of Dillon. "I remember some of the old-timers arguing about whether it was good or bad," Sampson said. "But all of us kids were excited."

The site, about 70 miles west of Denver, was ideal for Denver Water because of the large basin for water storage, the ability to send water via gravity down the Roberts Tunnel and the confluence of three rivers – the Blue River, Snake River and Ten Mile Creek – according to Sandra Mather's book, *Dillon, Denver and the Dam*.

Denver Water had been buying land near the site since the Depression, and by the mid 1950s, it owned most of the town of Dillon. In the late 1950s, Dillon's town government began making plans to relocate the town, choosing its current location from three possible sites.

Moving the cemetery was one of many things that had to happen before the dam could be built – vacant houses had to be torn down, 13 miles of highway had to be rerouted, and a hydroelectric generating plant and a U.S. Forest Service ranger station had to be moved. Most townspeople took advantage of Denver Water's offer to rebuild or relocate the buildings that had to be removed for the project.

Crews work on building the reservoir's "Morning Glory" spillway, which discharges water into the Blue River downstream of the dam.

Dillon Reservoir is a popular place for people to go boating, as seen here in this photo taken of Dillon Marina in late fall.

In the end, it took two years and 12 million cubic yards of fill to build the 231-foot-tall dam. When the reservoir opened in 1963, its 254,036 acre-feet capacity almost doubled Denver's raw water storage. And, with more than 26 miles of shoreline, it quickly became one of the prime recreation spots in the state.

"People absolutely love Dillon," said Denver Water's recreation manager Neil Sperandeo, who, as a child in Arvada read stories in the Denver newspapers about Dillon Reservoir's construction. "You can stay in the Dillon area and be entertained all day long."

The high alpine reservoir is easily accessible to people on the east and west of the state via Interstate 70. The towns of Dillon and Frisco have marinas at the reservoir, and boating, fishing, camping and picnicking are all popular activities there.

In the late 1980s, Denver Water signed an intergovernmental agreement with the U.S. Forest Service, the towns of Dillon and Frisco, and Summit County to manage the recreation of Dillon Reservoir. The agencies employ boat patrols and maintain 313 campsites and various picnic sites and trails in the area, Sperandeo said.

Throughout the summer, people camp, sailboat, kayak, bike, fish and enjoy the mountains surrounding Dillon. And, on a good windy day in the winter, people ice sail and kite board across the frozen reservoir.

“It used to be that the area’s economy was based on skiing in the winters,” Sperandeo said. “Now Dillon is a draw to the area in the summers too.”