

# the **WATER HAULER'S BULLETIN**

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## Control System Gives BTAP A Handle On Its Water

**T**he Blood Tribe Irrigation Project is an ambitious undertaking to bring irrigated agriculture to 10,000 acres of the Big Lease area on the Blood Reserve near Lethbridge. The infrastructure required to bring water to the Big Lease begins with the 20 km long Mokowan Ridge Canal that diverts water from the Belly-St. Mary Canal and carries it to the Mokowan Ridge Reservoir. From there water is released into the 14 km long Header Canal which provides service to a series of pipelines and pump stations.

"What makes the Header Canal somewhat unique and certainly a challenge to operate is that it essentially dead-ends at its last delivery point and there is no tail-out to take any spill water," says Gordon Ayers, P. Eng. with MPE Engineering Ltd. To

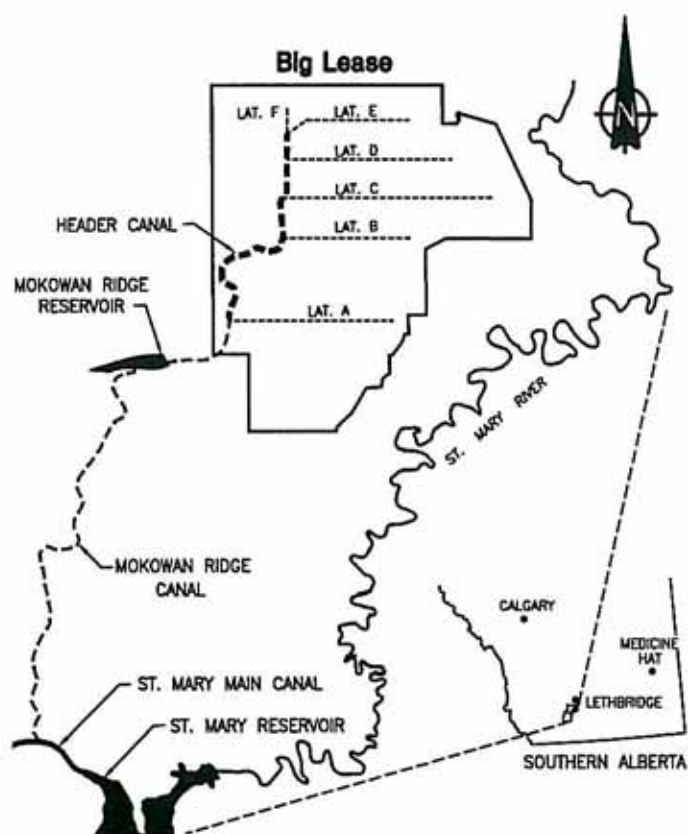


*Control panel at Mokowan Ridge Reservoir outlet structure.*



provide a measure of safety against overtopping the canal, the canal was constructed with level top banks along the final 4 km of its length. This affords some operational storage in the canal so that when demand for water changes, there is some buffering provided by the canal.

"However," says Ayers, "the canal can provide only about two to six hours of storage before either water spills over the emergency spillway or the pipelines run dry." This relatively small operating



Location plan showing Blood Tribe Irrigation Project.

range causes the Blood Tribe Agricultural Project (BTAP) operating staff to make many trips each day to verify water levels and flows. Up to now the demand for water has been nominal and it has been possible to keep up with the fluctuations in canal level. The situation will become more challenging when the final series of pipelines is completed.

"To assist the operating staff in keeping a handle on the flows and levels in the Header Canal, a control system was installed to provide monitoring, alarm call-out and remote control capabilities," explained Ayers.

Three control sites were selected, equipped with a PC for monitoring and control functions, gate position sensors, water level transmitters, and modems connected to the telephone system for communications to other sites and to the operating staff. The first of these sites is the main turnout from the St. Mary Main Canal. This site is under the jurisdiction of Alberta Environmental Protection and is monitored and controlled by them via their Waterton - St. Mary control system, however all of the information at the site is available to the BTAP operators. The second control site, Mokowan Ridge Reservoir outlet structure provides control of water releases from the reservoir into the Header Canal and is the key control site in maintaining balanced flows into the system. The third control site, a check-drop structure about half-way down the Header Canal, is automated to provide local upstream level control to maintain head on the Lateral A pipeline turnout.

Two monitoring sites were also installed. The first being installed on the Reservoir inlet structure and the second installed on the Header Canal, each consisting of a water level transmitter and a communication link.

A Master Station has been set up at the BTAP office to allow the operating staff to call each site and retrieve information, both current and past, on any of the items being monitored. "One important aspect of the control system is that when a water level or gate position goes outside its set operating range, or an apparent equipment failure is detected, the control system will call out an alarm to the operating staff," states Ayers. The operator can then log on from the Master Station and determine what action, if any, is required to remedy the condition and get the canal system back in balanced operation. The operators also have the ability to log on from home using a laptop computer.

For more information please contact Gordon Ayers, P. Eng., MPE Engineering Ltd., 2220 - 5th Ave. South, Lethbridge, Alberta, Canada T1J 4G6. Telephone (403) 329-3442. ■



# Grass Carp Available

## Carp Finally Hits Market

**J**uly 1, 1997 marked an important date for private industry and educational institutions in Alberta. The Eastern Irrigation District (EID) and Lethbridge Community College (LCC) joined their organizations in a very unique partnership. The EID and LCC signed a five-year joint venture agreement which will provide triploid grass carp for sale to the public starting in the spring of 1998. The partnership is called Cooperative Aquaculture Research Project (C.A.R.P.). "Grass carp are the first successful means of providing biological aquatic vegetation control in the province of Alberta," says Terry Schroeder, grass

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*Today the public can enjoy  
a safe and environmentally  
friendly product for controlling  
aquatic weeds in water bodies.*

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carp business manager with Eastern Irrigation District. "This method of biological vegetation control provides an environmentally friendly alternative to traditional chemical control."

Research in the triploid grass project was initiated in the late 1980s by Alberta Agriculture, Food and Rural Development (AAFRD). The EID and LCC started to participate in the project in the early 1990s providing funding and research facilities. The EID was originally interested in the project because it was possible that the grass carp could provide weed control in irrigation canals. LCC's participation in the program would enhance educational programs in the aquaculture area. The cooperation between AAFRD, EID and LCC has successfully brought the project forward to the present. Today the public can enjoy a



*Triploid grass carp.*

safe and environmentally friendly product for controlling aquatic weeds in water bodies.

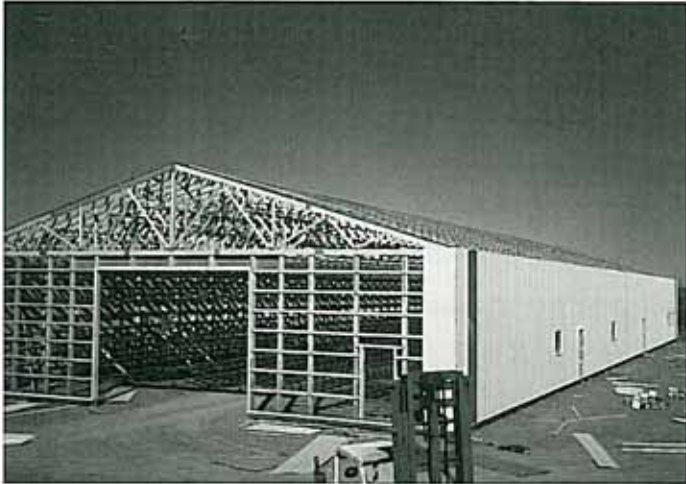
Triploid grass carp can be used in most water bodies to control weeds that will cause water quality to deteriorate over time. "The fish, when properly stocked in ponds, will graze the weeds found in most Alberta water bodies," states Schroeder. Vegetation controlled in past studies included: chara, canada water weed, water plantain and various species of pond weeds. The fish will provide effective control during their natural lives, estimated between eleven and fifteen years. The fish have proven effective in many regions of the Province, from southern Alberta to the Peace River region. Types of water bodies which can utilize grass carp are farm dugouts supplying; domestic water, dairy operations, green houses, etc., as well as in municipal water reservoirs, golf course water hazards, acreage ponds and small recreational lakes (parks). These can all benefit from the biological aquatic weed control that triploid grass carp can provide.

To provide a large quantity of high quality triploid grass carp the EID and LCC are investing approximately \$500,000 each, in state-of-the-art indoor rearing facilities. LCC's role is to hold and spawn brood stocks and provide three inch (80 mm) disease-free and triploid certified fish. The EID's role is to raise the fish to the market size of ten inches and one half pound (250 mm and 250 grams) and then market and distribute the fish across Alberta.

Both the EID and LCC are in the process of constructing their respective facilities. EID's facility, located in Brooks, will be operational by Christmas. LCC's



facility will be on line in the new year. The project's goal is to sell approximately 50,000 fish in 1998. Production will double in 1999 and full production of 160,000 fish per year will be reached by the year 2000.



*EID's triploid grass carp facility under construction.*

"To purchase fish, your water body must be ready to receive them and be certified by AAFRD," adds Schroeder, "which involves an inspection by a qualified biologist or engineer." AAFRD has to be assured that fish escape is not possible. The water body cannot be located in a 1/100 year flood zone and all water inlets and outlets must be screened. Once certified, the EID can be contacted to arrange for a delivery date. Other recommendations that should be considered is that the water body be well aerated and contain no predacious fish such as pike and also be well protected from predators, such as cormorants and blue herons.

For more information on pond licencing, pond management and triploid grass carp, contact Jack Stewart, head of licencing and inspection, Aquaculture Section, Animal Industry Division, Alberta Agriculture, Food and Rural Development, Lethbridge, Alberta, T1J 4C7. Telephone (403) 381-5164. Orders of triploid grass carp can be made by contacting Terry Schroeder, grass carp business manager, Eastern Irrigation District, Brooks, Alberta, T1R 1B2. Telephone (403) 362-1453. ■

## "Year 2000" Hits the Farm

**W**hen it comes to assessing irrigation water requirements and allocation needs, the impact is no more fundamental than it is at the on-farm irrigation level. Previous editions of the Water Hauler's Bulletin have provided an overview and some detail with respect to the undertakings of the Year 2000 Irrigation Water Study being carried out in partnership between the Alberta Irrigation Projects Association, Alberta Agriculture, Food & Rural Development (AAFRD), PFRA and Alberta Environmental Protection. This article will relate to the on-farm working group, which is one of three working groups of the Year 2000 water review study. With almost 65% of the water diverted to irrigation being consumed at the farm level and because that is where the major economic contribution of irrigation takes place, ultimately, that is the area where the majority of the water rationalization will need to be carried out.

"But do we know or can we document just what that water requirement is?" questions Wally Chinn, head of the farm irrigation management section with the irrigation branch of Alberta Agriculture, Food & Rural Development. "We do have a lot of instinctive answers to many of the issues, based on our past experiences and decades old research," Chinn adds, "but, as the industry heads into the next century, there is very little documented contemporary resource information that answers the water needs questions for irrigated southern Alberta."

"So that is what the On-Farm Working Group (OFWG) of the Year 2000 Study is attempting to do" says Chinn, who along with Gordon Zobell, manager of the Raymond Irrigation District, serves as co-chair of the OFWG. "From 1996 through the year 2000, several OFWG projects will be carried out to quantify and qualify all relevant information as it affects irrigation water requirements and water management at the farm level in southern Alberta."

**Crop Water Requirements:** Most of the information that is applied to project crop water requirements is



based on research work carried out 25 to 30 years ago . . . with crop varieties, irrigation systems and management technology available at the time. As a result, three field plot sites, located in three distinctly different irrigation areas (Bow Island, Rolling Hills and Picture Butte) have been developed to assess the water requirements of a high demand crop such as alfalfa, as influenced by new leading edge varieties, three-cut systems and a variety of more contemporary water application methodologies. It is hoped

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that after five years, better answers will be available to indicate whether or not current projections of water requirements are appropriate, too high or even too low, for crop production optimization. In addition, to support this field work, a complete information search, from sources inside and outside of Canada, is being conducted to provide a complete compendium of leading edge irrigation management reference information.

***Current Irrigation Management Practices (CIMP):***

Water use records of irrigators indicate that since 1985, irrigators have been using more of their allocated water diversions, applying an increasing percentage of the crop irrigation requirement. This has been due to both the producers' need to increase yields where commodity return margins are shrinking and because newer water application technologies are making it easier to get the extra water onto the crop. The vital questions are, "How much of their allocated water are irrigators presently using and what trends can be detected to project how close they may be or come to making full use of their rightful entitlement?" As a result, a five-year moni-

toring project, currently in its second year, where 60 different randomly selected field sites with various crops and system types, is being monitored to quantify their irrigation water usage as compared to the specific and expected annual maximum. It is proposed that this will give a base reference point to relate to as projections for future water use are input into the water allocation equation.

***Risk Assessment Model (RAM):*** If irrigation water is allocated over a greater acreage base, there can be an increased "risk" that optimum irrigation water requirements could not be met. The question then is, "What will this impact and how is the impact quantified?" Simply put, the most significant impact of water shortage is felt at the farm level in terms of net economic returns. There can also be a secondary impact at the value-adding industry level if yields are reduced and commodity quality affected. Therefore, this project is developing a computer-based model that will take historical agro-climatic data and lay that over any scenario of irrigation block size, crop mix, on-farm system type mix and conveyance infrastructure mix to assess the probability and scale of economic impact. Everything else that is being carried out in the Year 2000 Study ultimately funnels into this decision support model!

***Alberta Inventory of Farm Irrigation Systems***

***(AIFIS):*** With the mix of on-farm irrigation systems operating in Alberta today, water use/application effi-



*Water — our precious resource*



ciencies range anywhere from 20% to 85%. If an irrigation district, for example, knows what mix of systems has traditionally operated or is currently operating within its jurisdiction, it can evaluate what its future water demands will be, projecting on various scenarios of on-farm irrigation method and technology shifts. AAFRD has been maintaining such a system database in some form since 1965 and in a detailed fashion since 1981. Now, with the information being required for irrigation districts and their

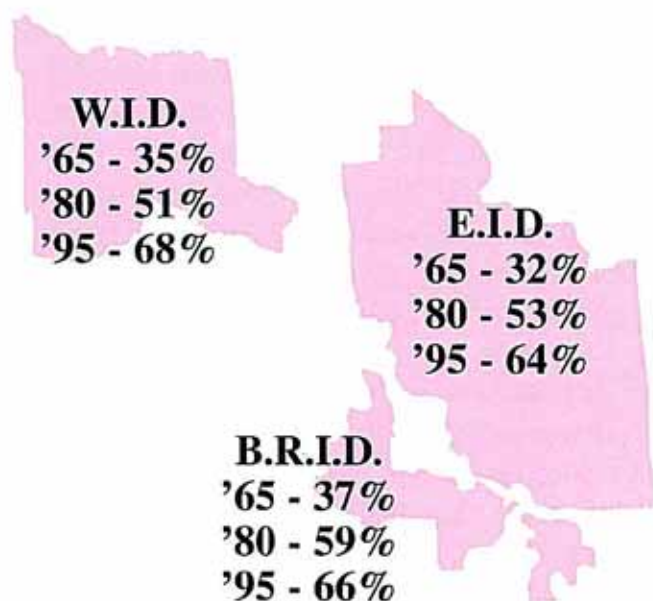


Fig. 1 - Examples of overall changes in application efficiencies of on-farm irrigation systems in the WID, EID and BRID from 1965 through 1995.

Year 2000 assessments of water allocation and management, this database is being expanded and coordinated with other inter-related databases and computer models. Figure 1 illustrates some of the changes in on-farm irrigation efficiencies over a 30-year period. As a "rule of thumb," where on-farm irrigation efficiency doubles, there can be a reduction in water requirement of approximately 25% to 30%.

For more information, contact Wally Chinn at the Agriculture Center in Lethbridge at (403) 381-5867 or Gordon Zobell at the Raymond Irrigation District, Raymond, Alberta, T0K 2S0. Telephone (403) 752-3511. ■

## The St. Mary Dam Spillway Replacement Project

Since 1951, the St. Mary Dam, 25 kilometres northeast of Cardston, has provided a reliable water supply to residents of southern Alberta. It was built by the Prairie Farm Rehabilitation Administration (PFRA) and transferred to Alberta Environment in 1973.

The St. Mary Dam and Reservoir are key components of the Waterton-St. Mary Headworks system. The system supplies water for half a million acres of irrigation farming in the Raymond, Taber, Magrath and St. Mary River irrigation districts as well as many municipalities, hydro power facilities, livestock operations and recreational users.

After nearly five decades of service, the St. Mary Dam spillway has deteriorated and is being replaced. Construction of the new spillway is the responsibility of Alberta Public Works, Supply and Services (PWSS).

The new spillway will have an increased capacity to meet current dam safety requirements. While the existing spillway was designed to handle a flow of 1500 cubic metres per second, the new spillway will handle 2500 cubic metres per second. The new spillway is being built 100 metres south of the existing structure. Once the new structure is completed, the old spillway will be demolished and the site will be restored.

Earlier this year, Advanced Construction Techniques (ACT) Ltd. completed a grouting contract for the left (north) abutment, and PCL Constructors Northern Inc. completed the earth and rock excavation for the new structure. The \$30 million contract for the construction of the spillway and replacement of Secondary Highway 505 bridge was awarded in July 1997 to NAC Constructors of Campbellville, Ontario, and work began in August. The new spillway is expected to be in operation by the summer of 2000.

Brian Soutar, project manager with PWSS, points to the local economic impacts. "The general contrac-



tor recently signed a contract with a local concrete supplier. More than 25 percent of the \$30 million contract for the spillway and bridge construction will be spent locally." Soutar also said the contractor is expecting to hire up to 80 people at the peak of construction and most will be from the local workforce.

The St. Mary Dam and Reservoir borders the Blood Reserve and the Blood Tribe has provided approximately 7,000 acres of reserve land since 1945 to accommodate the reservoir and the Belly Canal, which supplies water to the reservoir. The province is working closely with the Blood Tribe on this project. For example, the Blood Tribe is supplying aggregates, labour and equipment to the project.



Aerial view of St. Mary Dam showing new spillway location.

Photo provided by PCC Construction Northern Inc.

The new spillway will be 301 metres long (the existing spillway is 400 metres). The spillway will require 7,500 tonnes of cement, 3,000 tonnes of reinforcing steel, and 30,000 cubic metres of concrete. Final earthworks and site reclamation will include 47,000 cubic metres of topsoil replacement and seeding of 31 hectares.

The replacement spillway was designed by AGRA Earth and Environmental Ltd. and Kohn-Crippen Consultants Ltd., both of Calgary and MPE Engineering of Lethbridge. The total cost of the project is expected to be \$47 million. ■

## Alberta Irrigation Projects Association Annual Conference 97

**T**he Alberta Irrigation Projects Association (AIPA) will be holding its annual conference November 16-18 at the Lethbridge Lodge Hotel. Conference chairman, Dan Loewen says this year's theme is "Today's Technology - The Alberta Advantage." For more information please contact conference coordinator/ registrar Verna Lees. Telephone No. (403) 328-3063, Fax: (403) 327-1043, e-mail aipa@agt.net ■

## "AIM" Privatization

**O**ne of the original and oldest service programs, offered by Alberta Agriculture's irrigation branch, is going private. The Alberta Irrigation Management (AIM) program, in one form or another, has been delivered to irrigation farmers in Alberta since the early '60s and has been considered one of the department's flagship programs. Over the last three decades, hundreds of irrigation producers have taken advantage of the service provided and become more aware of how to better manage their irrigation water and soil resources, while optimizing their crop production.

The AIM program has been constantly evolving. It has transformed from a pure one-on-one "irrigation scheduling" service program in the '60s and '70s, to a training program in the '80s, a fee-for-service program in the early to mid-'90s, to training the private industry to take over the program in the latter part of this decade. "Each time the program was modified, there was a social, philosophical and/or economic consideration driving the change," says Roger Hohm,



irrigation management specialist with the irrigation branch. "The shift from service to training in the '80s was brought on by producers wanting to be trained to acquire the skills and knowledge to be able to handle the irrigation management job themselves. The shift to fee-for-service was an economic one. As government budgets became tight and program resources became more limited, there was a need to direct those limited resources at those irrigators who were prepared to make their own investment in the program to offset the costs of government delivery."

Because of the high profile and value that the AIM program has had in the field and within the industry as a whole, the prospect of terminating the program was not looked on too favourably. As the industry itself was shifting, a number of things came together at the same time which has made the transition opportunity to privatized delivery of the AIM program much more positive. First, given the realities of limited water supplies and on-farm production economics, there was a very well-recognized need for such a program. Therefore, Alberta Agriculture, Food & Rural Development (AAFRD) made a commitment to facilitate the ongoing availability of such a program or management resource by pursuing and evaluating a variety of alternatives. Secondly, technological advances in information transfer were growing significantly. Thirdly, and perhaps most significant was the fact that outside agencies and private sector companies involved in agriculture consulting, grain handling, special crop production and even water delivery were all hiring field staff to work more intensively with producers in recommending seed, fertilizer, chemicals and marketing. So...why not provide irrigation water management support as well?

Training of potential AIM field trainers was started in 1996 with a group of fieldmen from Roger's Sugar. This company wanted the training, as their fieldmen had been directed to work closer with the producers and had contracted out some of the traditional fieldmen duties. By having their fieldmen concentrating on growing the crop, they hope to increase the production of high quality beets which is vital to the company's bottom line.

In 1997 a total of 13 field people from five companies were being trained by irrigation branch staff. A

key comment from a couple of companies was that the AIM program fit very well with their companies direction and the whole farm package they were trying to provide to the producers. A comment like this one is encouraging to the department because it shows the program is important to these companies and will be continued for years to come.

What does the future hold? The department will continue training private company field staff, as long as the need exists. What's more important to these companies is that the department will continue to provide technical support for those who have already taken the training.

For further information on AIM privatization, contact Roger Hohm, Irrigation Management Specialist, Irrigation Branch, Alberta Agriculture, Food and Rural Development, Taber, Alberta, T1G 1V9. Telephone (403)223-7908. ■

#### THE WATER HAULER'S BULLETIN

Designed to provide the operation and management personnel of Irrigation Districts with items of interest in their line of work. Comments are welcome. Please contact Brian Taylor, editor, at (403) 381-5542, Lethbridge.

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