

## The Distribution, Growth and Survival of Hatchery Reared vs. Wild Coastal Cutthroat Trout in Tidal Waters

by Frank Dalziel, Technologist, Malaspina University-College

Of all the Pacific salmonids, we know the least about the biology and ecology of coastal cutthroat trout. There appear to be two main reasons for this: they are not commercially important and they usually occur in small numbers which do not support major sport fisheries. Many basic population questions remain largely unaddressed, including local distributions, population status and life histories. Even in areas of BC like Georgia Strait where status of stocks is better documented than the more remote areas, habitat problems and urban development appear to be responsible for significant declines in local populations.

Anadromous cutthroat trout have been designated as a species of management concern due to the extent of population declines and reduced habitat productivity. In response to this decline, many streams, estuaries and beaches that once supported significant cutthroat popula-

tions have been abandoned by anglers. Remaining fisheries are conducted in a fraction of the once productive area.

In response to the high demand for stream and beach fisheries, the Freshwater Fisheries Society of BC will begin to stock more high priority recreational fishing areas with anadromous cutthroat trout. These areas need to be constantly monitored to measure the success of the program. Malaspina University-College Department of Fisheries and Aquaculture faculty, students, and Trout Unlimited Canada volunteers monitor two high priority areas: the Englishman River estuary (stocked and wild fish), and the Nile Creek estuary and surrounding area (wild fish only). Each area is sampled once per week throughout the year when weather allows. Surveyors using fly rods collect the following information:

- date and the time spent fishing;
- number of surveyors (anglers);
- weather and sea conditions;

- approximate capture location;
- obvious presence or absence of prey species (e.g. salmon fry, sandlance, stickleback, juvenile herring, or invertebrates);
- time of capture of each fish;
- stage of tide (ebb, flood, height is calculated from the time observations);
- current (present/absent, and relative speed);
- length and weight of each fish;
- scale samples for aging, from selected fish;
- external parasite load (if any);
- capture of other species such as sculpin, sticklebacks, flounder, greenling or other salmonids;
- other observations (e.g. positive ID of cutthroat hooked but not landed, or cutthroat that jump in front of the anglers but are not captured);
- obvious hook scars from previous encounters;

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CASTING CREW: Kent Williamson (l), Frank Dalziel and Chris Stone survey fishing on BC's Englishman River (John Lund photo). Malaspina University-College (below) has been an integral partner in this research program.

- hooking location and bleeding (if any);
- number of other anglers encountered and relevant comments from any informal interviews;
- were anglers using a fly or lure?

Information collected will be used to:

- measure the growth of stocked fish,
- calculate catch per unit effort,
- assess the status and distribution of wild populations in the area; and
- to develop a detailed anadromous cutthroat revitalization strategy for each stream which may include hatchery supplementation.

Mr. Ted Brookman, a Regional Vice-President of the British Columbia Wildlife Federation believes that this project is important for two reasons: to gain more knowledge about the habits and distribution of sea-run cutthroat trout, and to introduce Fisheries students to recreational fishing (and fisherman) and the management issues surrounding this beautiful, but often neglected, salmonid. Students working on this project are being trained to be future stewards of this resource.

The project would not be possible without generous donations from many partners concerned about the future of sea-run cutthroat trout. Partners include: TUC Nanaimo Chapter and the TUC Coldwater Conservation Fund; Pacific Salmon Foundation and Living Rivers-Georgia Basin; Parksville-Qualicum Fish and Game; Nanaimo Fish and Game Club; Ladysmith Sportsman's Club; Chemanius Rod and Gun Club; and The French Creek Fishing Festival.

Preliminary results from 2005 were not encouraging. In addition to general low

numbers, the most disturbing observation was that virtually no wild fish were captured in the vicinity of the Englishman River, a former major natural producer of cutthroat. Most of the relatively few fish captured near Nile Creek were wild.

We usually worked in a crew of three and our cumulative catch per unit of effort (CPUE) was disappointing when compared to published values in other studies. To try to make sense of this, a CPUE was calculated for "experienced" and "inexperienced" anglers on the crew. We found that the experienced angler's CPUE compared favourably to other published CPUE's for sea-run cutthroat trout, while the inexperienced angler's CPUE was much lower. Sea-run cutthroat trout are known to be aggressive, but angler experience and training may be important factors to consider when assessing the likelihood of developing successful sports fisheries. Sampling in 2006 will allow us to judge whether these patterns in numbers and catchability are stable over time.

It was rare to see more than one or two other anglers fishing for cutthroat trout in tidal waters, but those who fish for them are very passionate about their sport. The sea-run cutthroat trout is one of the most handsome fish on the

Pacific coast. Perhaps with more active management, beaches and estuaries that previously supported good fisheries will do so again.

Malaspina has invested in the future of the sea-run cutthroat trout with awards from the Bamfield Fellowship, Malaspina Research Awards Committee, and the Malaspina Student Works Program. All in-kind Fisheries faculty wages needed to supervise and participate in fieldwork and analysis of the data are donated. Hopefully, in partnership with all of the groups mentioned above and the Ministry of Environment biologists, the future of this tide-water trout will be enhanced.

I hope that this is just the beginning of a long and fascinating association with a fish that many argue is the most beautiful trout in British Columbia, the sea-run cutthroat trout.

*The author would like to thank Dr. Chris Foote, Malaspina student participants Chris Stone, Kent Williamson and David Switzer, and B.C. Ministry of Environment Anadromous Fisheries Specialists Randy Dolighan and Mike McCullough for their advice and contributions to the project.*

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The Fisheries and Aquaculture facilities support applied research, education, training and technology transfer in fish and invertebrate culture, habitat and stock assessment, conservation and management.

The **Centre for Shellfish Research (CSR)** is a valuable resource to both faculty and students. The CSR addresses scientific and technical issues of the shellfish aquaculture industry, as well as social and economic concerns in coastal communities.

The **International Centre for Sturgeon Studies (ICSS) - Coming Soon!** The ICSS will provide research opportunities in sturgeon biology, management and hatchery technology for conservation and commercial purposes.

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# Delivering Meaningful Work “On The Ground”

## Launching Trout Unlimited Canada’s New Strategic Approach to Conservation Work

Presented by Doug Cressman, CEO and Jack Imhof, National Biologist, Trout Unlimited Canada

Doug and Jack have recently completed a cross-country visit with Trout Unlimited Canada members and chapters. Jack presented the draft National Conservation Agenda for discussion and Doug spoke to a variety of governance issues related to the National Board, provincial and regional councils as well as local chapters. If you missed the meetings, here is a distilled version of the presentation regarding the National Conservation Agenda.

### Our Mission

*“To conserve, protect and restore Canada’s freshwater ecosystems and their coldwater resources for current and future generations.”*

### The National Conservation Agenda

- Strategic conservation agenda for all levels of TUC;
- Provides the direction for implementing our Vision and Mission Statement at all organizational levels;
- It is coordinated by the National Office and implemented by all levels of TUC;
- Identifies the key areas of conservation interest and directs our program and project development;
- A strategic agenda reflective of the interests and concerns of grassroots members AND based on sound science.

### Key Considerations For A National Conservation Agenda

- Must clearly reflect strategic direction of TUC;
- Should inform National and Provincial Policy Development;
- Should address major issues and “drivers” of watershed and aquatic ecosystem degradation. Drivers include climate change, urbanization, old dam removal, flow regulation, forestry, mining, agriculture, aquaculture, etc.;
- Should promote and use strategic planning and design tools—tools that optimize environmental benefits resulting from land use management or change.

We are a grassroots organization and more... you are a member of a national organization.

AS SUCH, YOU HAVE A VOICE AND WE ARE HERE TO LISTEN TO YOUR VOICE AND THE VOICES OF ALL MEMBERS.

### The National Resource Board

The National Resource Board was launched in January of 2004 under the following parameters:

**Mandate:** The development and implementation of a strategic conservation agenda for TUC.

**Purpose:** Develop, ratify, implement, and assess key programs/projects that support TUC’s strategic conservation agenda at all levels—national, council and chapter.

**Reporting Structure:** Reports to Board of Trustees and CEO; NRB and CEO responsible for implementing the NCA.

**Membership of the Board:** Reflects grassroots membership and resource professionals. Includes other key National Conservation Organizations (i.e. NCC, PSF, ASF and DUC).

The Board consists of the following members:

- **Frank Dalziel**, Director, TUC, Nanaimo Chapter, BC;
- **Ron Pearson**, LLB, TUC, Edmonton, AB;
- **Dr. Bruce Dancik**, Chair, TUC, Edmonton, AB;
- **Tom Adamchick**, TUC, Eganville, ON;
- **Dr. Alan Curry**, TUC, NB;
- **Rev. Stephen Booth**, Vice-Chair, TUC, NS;
- **Jack Imhof**, National Biologist, TUC;

- **Jim VanTine**, Director, Haig-Brown Institute;
- **Dr. Paul Kariya**, Executive Director, Pacific Salmon Foundation;
- **Lorne Fitch**, Co-ordinator, Alberta Cows and Fish;
- **Dr. Alex Bielak**, Director, Science Liaison, Environment Canada;
- **Dr. Stephen Born**, Former Chairman, NRB, TU USA;
- **John Riley**, Director, Conservation Science and Stewardship, Nature Conservancy of Canada;
- **Patrice LeBlanc**, Director, Habitat Programs, Fisheries and Oceans Canada;
- **Todd Dupuis**, Director of Operations, Atlantic Salmon Federation;
- **Dr. Henry Murkin**, Director of Research, Ducks Unlimited Canada.

### Components of the NCA

- Policy content and policy development approach. *Definition of Policy:* a statement of position and intent;
- Program content and program development approach. *Definition of a Program:* a plan and structure of intended activity.

### The NCA Structure

Comprised of four briefs:

- Two Policy Briefs:
  - Guiding Policies and Their Implications for Management and Programs;
  - Process for Developing New Specific Policies on Resource Issues.
- Two Program Briefs:
  - Program Structure of the National Conservation Agenda;
  - Process for Developing Programs for TUC.

### Major Issues Affecting Key Themes

- Water quality (affected or conditioned by):
  - resource industries;
  - production industries;
  - agriculture;
  - urban;
  - climate change;



## Delivering Meaningful Work...

- long range transport of atmospheric pollutants (LRTAP).
  - Water quantity (affected or conditioned):
    - floods and droughts;
    - climate change;
    - allocation/re-allocation, transfers;
    - groundwater/surface water interactions;
    - flow regime.
  - Habitat degradation (affected or conditioned):
    - watershed land use;
    - land use change;
    - riparian/floodplain characteristics;
    - channel health and stability;
    - channel alteration (e.g. channelization/agricultural drainage);
    - river corridor alterations;
    - wetlands;
    - estuary changes.
  - Habitat protection/restoration:
    - advocating better land use policy;
    - advocating use of Best Management Practices;
    - education and awareness;
    - aquatic and riparian restoration at a site and watershed level.
  - Fish community management (affected or conditioned):
    - exotic species management;
    - harvest issues;
    - population assessment;
    - connectivity;
    - native species;
    - compliance;
    - enhancement.
- Restoring Wild Trout and Salmon.
- From the three National Program Themes come a set of Program Areas that focus on specific and strategic delivery areas:
- watershed renewal;
  - watershed protection;
  - Yellow Fish Road;
  - Yellow Fish Rural;
  - instream flow restoration (and protection);
  - measuring the resource;
  - science development for restoration.

Included in this are the National Programs that exist or should exist to focus the themes. Inherent is the need for more specific policies on specific issues and additional program development as is deemed necessary. Development of the expertise of our volunteers comes through development of tools for them.

Each Province can have unique or unusual circumstances or issues that will require specific programs or modifications of National Programs. This refinement or development is one role of Provincial Councils, working with Chapters and National Staff.

A key element in all our work will be training Chapter members to become the experts on their local water and to develop their expertise on developing projects, monitoring the resource and delivering good and meaningful work on the ground.

Chapters have been and continue to do extremely meaningful work. The National Conservation Agenda seeks to build on these fine efforts, focus them and have them nest within a larger, Strategic Program structure.

All our Chapters and members must be able to see where their projects and local programs fit under the umbrella of the National conservation Agenda.

**Even when working locally, we are ALL part of a National Organization.**

### GET DIRTY, GET WET AND GET ON BOARD...

To find out about how you can join in to help protect and enhance our cold water fisheries, visit

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### Major Conservation Themes

These substantive themes have been identified as our key conservation areas of focus to fulfill our mandate:

- Water Quality;
- Water Quantity;
- Habitat Management;
- Fish Community Management.

### Building The National Program Structure For The NCA

We developed our understanding of the types of programs needed from the Chapter information up, and we crafted our Program structure from our Conservation Agenda themes down. Three fundamental Program Themes were identified:

- Home Waters;
- Watershed Education;

# Reversing the Flow: Watershed Planning in the South Saskatchewan Basin

by Ron Pearson, LLB

The first comprehensive watershed plan for Alberta is currently being defined in the South Saskatchewan River Basin. This Basin is composed of the watersheds of the Red Deer, Bow, Oldman and South Saskatchewan Rivers. These are the most heavily utilized rivers in the Province and authorized usage is considered to be seriously over allocated. The challenge is to meet the modern demands of economic growth, environmental health and climate change while at the same time overcome a history of water management in the basin that was characterized by a benevolent consumption ethic.

The history of water use in these areas began with the agricultural growth that followed the opening of the CPR. Irrigation was seen as the means by which large scale development could be encouraged. Federal legislation vested the control of water in the Crown. In turn, the Crown authorized the withdrawal and use of water under licence. The Province of Alberta acquired this control of water from the feds under the natural resource transfer agreements in the early 1930's. The licences granted, up to the mid 1970's, by both the Feds and Province were very generous. Perceived to exist in unlimited abundance, water was typically licensed for the asking. Licences were granted in perpetuity at no cost to the user. The user acquired a priority over subsequent users based upon the date of its licence.



This priority, referred to as “first in time, first in right”, is based upon time only and has no reference to the value of the use for which the water is taken.

In addition to licence priorities, the right to take water is also limited by an

apportionment agreement with Saskatchewan. Alberta has agreed, by contract, that 50% of the natural flows of the river will pass annually into Saskatchewan. This acts as a limit on the amount of water which can be withdrawn under the licences. In a dry year, the ‘junior’ licensee may not be able to take water.



Alberta's water legislation was reformed in 1999 under a new Water Act. The Act has many progressive features to govern future water allocation. It may be controlled by the terms of watershed plans, environmental priorities and renewal reviews of licences. However, these reforms only apply to licences granted af-

ter 1999. Licences already in existence at that date were “deemed” to continue under their original terms and to be largely exempt from the terms of the Act. This was a political decision to recognize the importance of the irrigation industry, and

give security to municipalities and users who had invested in reliance on their licences. Accordingly, while the new Act has high potential to ensure effective development of other watersheds in the Province, the South Saskatchewan Basin presents challenges. Available water has already been fully committed under the deemed licences.

Today the water in the South Saskatchewan Basin is allocated 75% to the 13 Irrigation Districts (under 25 senior licences); 7.5% to private irrigators under 2,250 licences; 7% to municipalities; 2.7% industrial; 2.5% water management (storage) and 3.8% misc. agricultural uses. The area is growing, supply is shrinking, and the challenge is to reallocate water to the growing needs of the area.

This is being encouraged in the context of both respecting the “deemed” licence rights and encouraging effective watershed plans for the future. Alberta's first watershed plan, for the South Saskatchewan, has been released (in two phases) over the past several years. Although still in draft form it is likely to be presented to cabinet for approval. It has effectively placed a moratorium on the granting of any new licences in the Basin. Future licences are to be restricted to storage; environmental; and innovative, low consumption uses. It has set water conservation objectives on the most sensitive river areas, thus placing additional restrictions on junior licences in low water years. It has authorized licence transfers and encouraged the development of structured water markets in the future. It has recommended that transferred water be subject to a 10% holdback for conservation purposes. It has encouraged the government

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# “Who Me? Part of a Watershed?” Don’t Flush Yet!

by Lorne Fitch, Professional Biologist, Cows and Fish Program

I’ve got the handle in my hand, ready to flush. My eye catches an announcement in the paper I was reading, in the quiet room of the house. It’s for a watershed meeting to be held here in town. As the noise of the toilet flushing echoes, I think, “who, me, part of a watershed?” As I wash my hands I muse, “I live in town, I don’t live on a lake or next to a river”. Brushing my teeth I say to myself, “I don’t fish and I don’t raise cattle that drink out of the river”. The coffee noisily percolates and I wait impatiently for that first cup. Fortified with a jolt of caffeine I remark, “I don’t know what all the fuss is about. Water is water; it comes out of the tap.” That reminds me to mix up some orange juice. I use the bottled water, pour it into the juice concentrate, mix and thirstily drink a glass. The water holds the sweetness of Florida sunshine in suspension. The last drops drain out of the glass and my answer is, “No, I don’t know why I would be interested in a watershed meeting.”

Satisfied with my decision I head off to work. It’s a lovely morning and I linger beside the car savoring the sunshine. Bird song puts my ears on alert and a flash of yellow captures my eye. I think, “That’s a funny looking sparrow”. I glance over and see my neighbour sitting on her porch peering through binoculars. She’s a bit odd; there have been words over her yard. It’s become a wild and untidy place with what looks like weedy plants springing up everywhere. She replanted her lawn to some native stuff and she never waters or fertilizes it.

This morning though, the differences over yard care seem to have disappeared and she is visibly excited. She shouts to me that the bird is a yellow warbler, the first of the year. “It’s just flown up from South America, almost 9000 km to get here.”

“Nine thousand kilometers!” I think to myself, “how does a tiny bird manage that feat?” Despite the differences I have with my neighbour this intrigues me and I have to ask how this is possible. “Even though these birds only weigh the equivalent of two twenty five cent pieces they manage that migration by stopping in the rich, treed areas along rivers and streams and around lakes and wetlands.

They fuel up on insects and then make the next leap”. I’m amazed; these wooded areas must be the bird equivalent of our Seven-11’s.

The morning passes at work. My ears perk up at a news report on the radio of a boil water order in some other community. “Boil water, I wonder what that’s about?” says one of my coworkers.



ties in Alberta get all of their water from surface sources like lakes or rivers. Even though we have a well you have to think about where that water comes from; it comes from the surface and slowly trickles down. That water comes from a huge area and even though a lot of stuff gets filtered out, there’s an increase in some chemicals.”

**“We’ve ignored our river, turned it into one of the back alleys instead of a front street we could be proud of.”**

SOMETIMES OUR THINKING IS PRETTY NARROW; WE ARE ONLY INTERESTED IN OUR OWN BACKYARDS. BUT OUR BACKYARDS ARE HITCHED TO EVERYONE ELSE’S IN THE WATERSHED—AND WHAT HAPPENS 50 KM AWAY DOES AFFECT US.

Photos at left and below: Lorne Fitch.

“It’s not about childbirth, corn or canning”, says another. “There’s either too much mud in the water and it can’t be cleaned, or some bug has got into the water and only boiling it will kill it.”

The thought of boiling water and mud reminds me its coffee time and I head down to the corner café. The usual crowd is there, dissecting the events of the day. I sit next to the fellow that runs the water treatment plant. When there’s a lull in the conversation I ask him about this boil water order. He replies that there are more and more of these to meet drinking water standards.

One of the curmudgeons in the group snaps, “So what if the river is muddy and is covered by green scum—can’t they filter and treat the water with something? Anyway, don’t we get our water from a well?”

The treatment plant operator smiles at the opening he’s been given. “Yes, we get our water from a well but most communi-

“What kind of chemicals?” snorts the curmudgeon.

“Well, things like pesticides, herbicides and nitrates, that come from fertilizer or



# Congratulations to TU Canada's Streamside Assistance Lottery Winners!

**T**rount Unlimited Canada would like to thank **Toyota Canada** and congratulate all participants and winners of the Trout Unlimited Canada Streamside Assistance Lottery.

The Trout Unlimited Canada Streamside Assistance Lottery was a very successful fundraiser which was made possible by the support of Toyota Canada—our national Partner in Conservation. Toyota Canada's generosity has made it possible for Trout Unlimited Canada to pursue its mission to conserve, protect and restore Canada's freshwater ecosystems and coldwater resources for current and future generations.

**Toyota Canada has generously donated THREE vehicles** for raffle across Canada. Next year's vehicle will be raffled in Ontario and the third vehicle will be raffled in the Maritimes.

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A very happy Lynn Gallen receiving her prize from TUC's CEO, Doug Cressman.

### Third Prize Winner:

#### ANDREW SHAW, Edmonton AB

#### A float on the Bow River for Four

#### with Four TFO Rods. Valued at \$1,700.

Thank you to all Alberta Trout Unlimited Canada members for supporting this worthwhile initiative. All of the proceeds will be going directly to Trout Unlimited Canada's Cold Water Conservation Fund, supporting conservation and restoration projects in Alberta.

animal manure. Even stuff like the weed and feed you put on your lawn can sneak into the ground water. All of these things, including mud, are hard to remove and can be very expensive, especially for a small town like ours with a limited tax base. Our best, and cheapest, option is protection of the water at its source. That's why many towns are starting to work with the rural counties on watershed protection—it's where our water comes from.

"But," he said, "there's another side to this—we treat our waste water and put it into the river. There are at least three communities downstream of us that take water right out of the river."

The curmudgeon snorts again and sarcastically retorts, "Should we flush twice for them?" That ended the coffee break!

The phone rings at work; it's a rancher north of town with a side of beef I ordered from him. We agree to meet at my place for lunch. Over sandwiches I tell him about my morning of water, watersheds and birds. He listens intently, with a wrinkle on his brow. He starts to talk. "After 40 some odd years of ranching I thought I knew it all. I'm embarrassed to say there are some things I should have known more about. Back in the 70's I went to a bunch of seminars where they told me I had to be more profitable and ef-

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# Trout Unlimited Canada



### Doug Cressman

Chief Executive Officer  
dcressman@tucanada.org



### Bethe Andreassen

Editor, Currents  
tuc@tucanada.org



### Silvia D'Amelio

Ontario Biologist  
sdamelio@tucanada.org



### Lorne Hutchison

Director,  
Finance and Administration  
lhutchison@tucanada.org



### Jack Imhof

National Biologist  
jimhof@tucanada.org



### Anna Lee-Carswell

Program Director,  
Yellow Fish Road™  
aleecarswell@tucanada.org



### Brian Meagher

Alberta Provincial Biologist  
bmeagher@tucanada.org



### Don Pike

Special Events Director  
dpike@tucanada.org



### Len Yust

Executive Director, Ontario  
lyust@tucanada.org



### National Office:

Ste 160, 6712 Fisher St SE  
Calgary, AB T2H 2A7

Tel: 403-221-8360

Fax: 403-221-8368

1-800-909-6040



### Ontario Office:

Unit 24, 3455 Harvester Road  
Burlington, ON L7N 3P2

Tel: 905-333-1994

Fax: 905-333-1964

1-877-733-1994

**tuc@tucanada.org**

**www.tucanada.org**

### Currents layout:

David Soltess Design  
dsdesign@telus.net



## “Who Me? Part of a Watershed?”

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ficient.” He spit the words ‘profitable’ and ‘efficient’ out. “So I fired up the cat and bulldozed all the willows and poplars off my bottomlands by the big river. And they were right, for a few years I could graze more cattle and it was more profitable. Then the first flood came along.

“Without the willows and the trees to glue the riverbanks together the river just ate them up. I tried to slow down that erosion, I even got the government to help. We dumped rock, concrete slabs and even old car bodies. Nothing worked; the river ate those up too. I figure I’ve flushed more than five acres of my best pasture down the river. I wish I had those willows back. If I had it to do again I wouldn’t touch that brush next to the river.”

The beef is safely stored in the freezer and I decide to walk back to work. Around the corner one of my neighbours, a retired farmer, is trimming his hedge. He’s a quiet, thoughtful man and I share some of the day’s events with him. “As I get older I see more,” he mused. “I grew up fishing, I suspect it kept me out of a lot of trouble”, he said, with a mischievous twinkle in his eye. “This river used to have walleye in it and I once caught a 12 pound pike. It’s hard to find a fish anymore and that worries me.”

“But if you want fish, can’t you buy fish sticks?” I say, prodding him a bit. “Can’t stand them!” he replies, “Fish in the river tell me the place I live is healthy; that’s why I’m worried.” He’s quiet for a moment,

thinking about something else. “Fishing and being next to the river helped me see my place in the world. It’s about making connections, something that eating fish sticks will never do for you. I want my grandchildren to be able to fish, to make those same connections I was able to make. How can they if we’ve used up all their chances?”

I almost miss the building where I work; I’m so lost in thought. Waiting for me is a county councilor and I apologize for being distracted by this watershed stuff. She waves off my apology. “Sometimes our thinking is pretty narrow” she recounts, “we are only interested in our own backyards. I used to think, so what if someone drains a mosquito-infested slough 50 km from my back door. How is this going to affect me?” She goes on to say, “The problem is that our backyards are hitched to everyone else’s in the watershed. We’ve got a situation where the folks in the headwaters want more drainage, to get rid of those sloughs that hold all the snowmelt. The people in the middle, especially here in town, have more flooding and bigger floods because the water all runs off too quickly with the sloughs gone. Then, the people at the bottom end of the river complain there’s no water left for most of the year.”

I think to myself that I’m glad to be on higher ground but I do remember the ban on lawn watering during the drought a couple of summers ago. “It’s like we’re all living in different areas with different ideas about what we want, but we are all part of the same watershed. We’ve got to figure this out together,” she says.

After supper I take a short drive to clear my head. I cross what I thought was a drainage ditch and it strikes me, “No, this is the river!” There’s no sign on the bridge and I’ll bet many of my neighbours don’t realize this is their river. No wonder it doesn’t get any respect! We’ve ignored our river, turned it into one of the back alleys instead of a front street we could be proud of. It’s been quite a day. At the last flush of the evening I think, “Me, I’m part of a watershed!” I’m going to go to that watershed meeting, meet my neighbours and get educated about where I live.



## Reversing the Flow: Watershed Planning in the South Saskatchewan Basin

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to allow private organizations to buy existing licences for conservation purposes.

It remains to be seen whether the reforms and directions recommended under this management plan are going to help ease the stress on these systems or whether they are merely incremental in nature. It is a new direction. The answer likely lies in effective reallocation (i.e., transfer of licences to better uses) and appropriate storage programs. There is also a high potential in the basin, since the major senior allocations are in downstream areas, to focus on source water protection. The government will have to manage conflicts carefully and have the political will to encourage transfers, and curtail the future expansion of irrigation and heavy industrial use.

For detailed information on the South Saskatchewan Basin Plan see: [http://www3.gov.ab.ca/env/water/regions/ssrb/draft\\_plan.html](http://www3.gov.ab.ca/env/water/regions/ssrb/draft_plan.html)



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