SUSTAINABLE TIMES

The Fish Issue

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Trace Metals and Fish

The Terrestrial Environmental Effects Monitoring group (TEEM) of the Wood Buffalo Environmental Association (WBEA) funded a community-based study to determine trace metal concentrations in traditional food resources used by the Fort McKay and Fort Chipewyan communities. While not part of the Cumulative Environmental Management Association (CEMA), TEEM does play a large role in monitoring and studying the potential terrestrial impacts of cumulative effects in the Regional Municipality of Wood Buffalo. In addition to plants and mammals, this TEEM study included pike, walleye, lake whitefish and a few samples of sucker, goldeye, lake trout and burbot. These fish samples were gathered by the people of Fort McKay and Fort Chipewyan in areas selected by their elders. The sample sites were grouped into three regions; less than 50 km from the Syncrude and Suncor stacks, 50 to 100 from the stacks, and greater than 100 km from the stacks. The fish samples were analysed for aluminum, arsenic, cadmium, lead, mercury, nickel, vanadium, and zinc. A draft report of the study is currently in review and is expected to be finalised this spring and available on the WBEA web site (www.wbea.org).

Trace metal concentrations in the fish samples further from the stacks were generally similar to or greater than concentrations in samples collected closer to the stacks, indicating that trace metals released into the air from oil sands stacks do not appear have an effect on the metal content of fish tissues. This study did not examine the effect of metals released into the water.

This study does support the Health Canada fish consumption guideline of 0.5 mg/kg wet weight. All samples of walleye collected for this study contained less mercury than the fish consumption guideline for the Athabasca River system which indicates that walleye should not be consumed by women of child-bearing age and children under the age of 25, and others should not eat more than one meal of walleye per week. Some samples of goldeye, sucker and pike contained mercury concentrations in excess of the Health Canada fish consumption guideline. The study did not identify whether the mercury was due to natural or human sources, but found that the concentrations of mercury in traditional foods does not appear to be related to oil sands stack emissions. The concentrations of the other metals in the study in traditional foods do not appear to be of concern to human health, based on current knowledge.

Provincial Northern Pike and Walleye Management

The overall goal of the pike and walleye management plans is to sustain the abundance, distribution and diversity of natural reproducing northern pike and walleye populations and provide domestic, recreational, commercial and economic benefits to Albertans.

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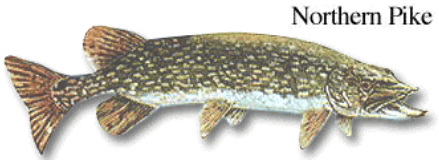


Relative to other parts of the country, Alberta is not endowed with an abundance of surface water, nor does the available habitat support an abundance of northern pike and walleye. In comparison with other provinces and territories, Alberta ranks eighth in terms of the proportion of surface that is covered by water. Of over 2100 lakes surveyed in Alberta only 1030 contain game fish, and only 177 of these contain walleye. Over-harvest has reduced stock densities and the resulting loss of natural reproduction is the major factor in the decline. Lakes within the Regional Municipality of Wood Buffalo are not as productive as lakes in the southern part of the province and are vulnerable to over-exploitation. In most walleye populations in Alberta, male walleye do not reach maturity until after age seven, and females until after age nine. In contrast, in lakes in warmer parts of the continent, male walleye can reach maturity in two to four years, and females in three to six years. Northern pike in Northern Alberta also take a few years longer to mature than those in warmer climates; it takes about five years for males and seven for females in the north, versus three years for males and four for females in southern latitudes.

Alberta has implemented a classification system which recognizes differences in fish populations, but results in a simple management strategy with few different fishery regulations. The system identifies four general categories of fish populations; (1) *trophy*, (2) *stable* (high productivity), (3) *vulnerable* (no risk and low risk) and (4) *collapsed.* Criteria used to define these categories are listed in Table 1 for pike and Table 2 for walleye. Based on the classification of a population, management strategies, harvest strategies, and fishery regulations are derived from a management model.

Table 1. Northern Pike Population Criteria for Trophy and Stable Status Categories

Biological Characteristic	Trophy	Stable
Catch per Unit Effort (kept)	> 0.8	> 0.8
Catch per Unit Effort (total)	>2	1-2
Success (% anglers)	100%	> 70%
GINI Coefficient (total)[1]	<0.3	0.3-0.5
Mean weight	> 2 kg	1-2 kg
# Measurable Age-classes[2]	>10	7-12
Growth rate	Slow	Slow
Proportional Stock Density (%)	> 80	>40
Relative Stock Density (stock – quality)	<20	<50

[1]A numerical measure of inequality
[2]An age class is measurable if CUE > 0.2 pike/hour

Five important components of pike and walleye management are:

- Regulate harvest in line with, and not exceeding, the production capability of the fish populations.
- Recover populations to their maximum production within natural biological and habitat limitations
- Restore and maintain the natural productive capacity of northern pike and walleye habitat, and where possible and appropriate, increase the amount of productive habitat.
- Restore and maintain the abundance distribution and diversity of northern pike and walleye populations through natural reproduction.
- Allocate the appropriate uses of northern pike and walleye resources to achieve a range of optimal public benefits that support the fish conservation goal.

Table 2. Walleye Population Criteria for Trophy, Stable, Vulnerable and Collapsed Status Categories

	Management Status Category			
Biological Characteristics	Trophy	Stable	Vulnerable	Collapsed
Age-class distribution	Wide (>8 year classes), Mean age >9 year	Wide, Mean age 6-9 year	Narrow (1-3 year classes), Mean age 4-6 year	Wide or Narrow, Mean age 6-10 year
Age-class stability	Very stable	Stable	Unstable	Stable or unstable
Growth (length-at-age)	Slow, 50 cm in 12-15 years	Slow, 50 cm in 9-12 years	Moderate, 50 cm in 7-9 years	Fast, 50 cm in 4-7 years
Age-at-maturity (mean age)	Females: 10-20 years Males: 10-16 years	Females: 8-10 years Males: 7-9 years	Females: 7-8 years Males: 5-7 years	Females: 4-7 years Males: 3-6 years
Catch rate	>1-2 kept/hour	0.5 kept/hour	0.15 kept/hour	0.05 kept/hour

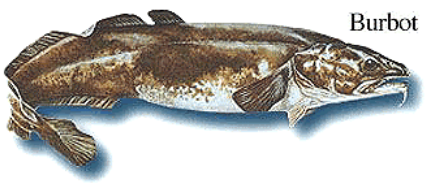
The overall fish use policy is to *recover collapsed and vulnerable pike and walleye populations to stable status wherever possible and sustain stable and trophy status populations*. The fish-use policy emphasizes conservation, but provides for domestic, recreational and commercial benefits, now and in the future. Opportunities to harvest some pike and walleye will be permitted so long as the primary emphasis upon conservation is not compromised. In order to sustain healthy trophy and/or stable populations, restrictive sport fishing regulations are required.

RAMP Fish Studies

The Oil Sands Regional Aquatics Monitoring Program (RAMP) has been monitoring fish populations in the Regional Municipality of Wood Buffalo since 1997. RAMP is not part of the Cumulative Environmental Management Association (CEMA), but it does conduct monitoring and studies of potential aquatic impacts of cumulative effects in the Regional Municipality of Wood Buffalo. Recently RAMP has been focussing on the following fish studies: radio telemetry study on longnose sucker and northern pike, analysis of contaminants in tissue samples from fish in the Athabasca and Muskeg rivers, tributary indicator species monitoring to assess the health of slimy sculpin populations in the Muskeg and Steepbank rivers, and a general fish inventory for the Muskeg River Basin.

The radio telemetry study was conducted to evaluate the mobility of longnose sucker and northern pike using the Athabasca and Muskeg rivers and to identify their over-wintering locations. Fish of both species that spawned in the Muskeg River displayed greater use of the Athabasca River Basin during much of the year.

Muscle tissue samples from lake whitefish and walleye from the Athabasca River and northern pike from the Muskeg River were collected and analysed for concentrations of organic and inorganic contaminants. Polycyclic aromatic hydrocarbons (PAH) were not detected in the samples collected in the fall of 2001. With the exception of copper (the data were inconclusive), metal concentrations in muscle



tissue were found to be below those reported to be linked with negative effects on growth and survival of fish. When compared to fish consumption guidelines, the fish tissue data indicated no exceedances of the guidelines. The concentration of mercury in one female walleye sample from the Athabasca River in 2001 was close to the Health Canada consumption guideline.

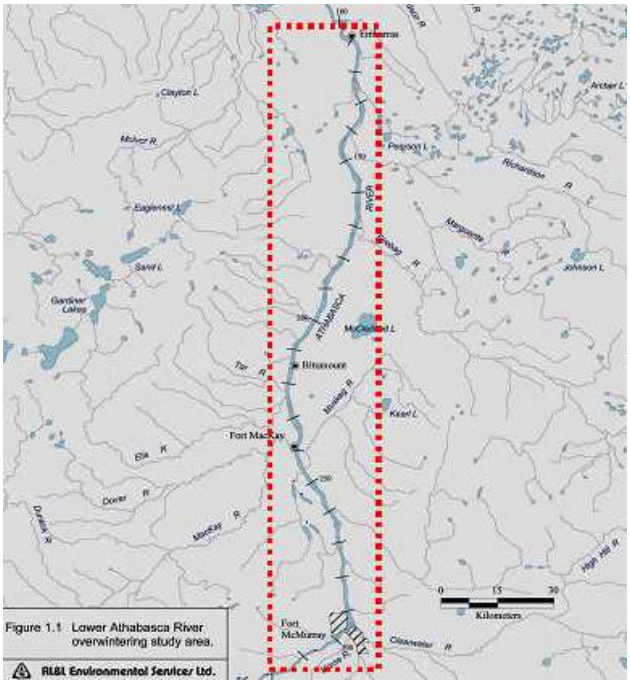
The tributary sentinel species study involved monitoring population and health factors for a small-bodied fish species exposed to activities in the oil sands area, in comparison to reference populations outside the development area, as an indicator of ecosystem health. Populations of slimy sculpin in the lower Steepbank River and lower Muskeg River were compared to other tributary populations. Gonad size in male fish at exposure sites on the Steepbank and Muskeg rivers was lower than gonad size at reference sites.

The objective of the general fish inventory was to monitor species presence, relative abundance and community structure in the Muskeg River Basin, including the lower Muskeg River and Jackpine Creek. Ten fish species were identified in the Muskeg River including sport fish, sucker species and small-bodied species. The most abundant species were longnose bodied species. The most abundant species were longnose sucker, trout-perch, emerald shiner and white sucker. Seven fish species were recorded in Jackpine Creek, including 1 sport species (northern pike), 1 sucker species and 5 small-bodied species. Lake chub were the most abundant species. *(The information in this article is from the DRAFT 2001 Oil Sands Regional Aquatics Monitoring Program Report.)*

Fish Overwintering Use of the Lower Athabasca River

Since it's inception two years ago, the CEMA Water Working Group's Instream Flow Needs (IFN) subgroup has been busy evaluating fish overwintering use in a 200 km section of the lower Athabasca River mainstem from Fort McMurray to Wood Buffalo Nation Park (see figure 1.1). Ninety-nine fish were tagged with coded transmitters between September and October 2001 and released into the Athabasca River around Fort McMurray, Northlands, and the mouth of the Muskeg

River. The fish (walleye, northern pike, whitefish, goldeye and burbot) were tracked by telemetry flights approximately every ten days, by continuous recordings from ground base stations, and by on-ice telemetry. In addition to tracking fish movements, a fish capture program was conducted to examine winter feeding patterns of local fish. The results of the IFN study indicate that many fish inhabit the lower Athabasca River during the winter. While some radio-tagged goldeye and whitefish left the study area (likely to overwinter in Lake Athabasca), most radio-tagged walleye and all pike remained in the study area and preferred shallow and slow habitats. Fish abundance upstream of the oil sand activity appears to lower than in the downstream reaches, and goldeye appears to be most abundant in the middle reaches, between Ells River and Eymundson Creek. The survey also indicated that many goldeye and pike feed during the winter.



Did you know?

- The lake sturgeon is Alberta's longest fish species, reaching over 2 metres in length.
- The world's largest lake trout was caught in Lake Athabasca, and weighed in at 102 pounds.
- One of the smallest fish in Alberta is the Iowa darter which reaches a maximum length of 7 cm.

- from The Provincial Museum of Alberta web site (http://www.pma.edmonton.ab.ca/)

Catch & Release

Sportfishing is so popular that demand often exceeds the capabilities of Alberta waters to produce sufficient numbers of fish. Catch-and-release, or zero-catch limit, fishing is part of the solution. By releasing fish, anglers allow a single fish to be 'recycled' to provide recreation for others. Catch-and-release fishing results in greater numbers of larger fish.

In a time when angling pressure is increasing and exceeds the supply of fish, catch-and-release fishing is an important means of conserving fish resources. In order for catch-and-release fishing to be an effective management tool, the fish must survive after release. Here are some guidelines:

- Minimize the time that you play the fish once it is on the hook. Playing a fish to exhaustion may cause it to die later.
- It is better to keep fish in the water while handling and releasing them. If you must handle fish, wet your hands completely or wear soft cotton or wool gloves that have been soaked in water. This will prevent damage to the fish's protective mucous surface.
- If you must measure or photograph your catch, have your measuring board or camera ready, and act quickly. **Minimize the time the fish is out of the water.**
- Hold the fish gently under its belly and by the area in front of the tail. Never squeeze a fish or touch a fish's eyes or gills. If you are releasing the fish, hold it in the water for a few moments before letting go so the water oxygenates the fish. A fish is ready to be released when it maintains an upright position and actively swims out of your hands. Never just throw a fish back into the water.
- When you are practising catch-and-release fishing, prepare in advance to release your fish. Choose a hook that can be removed from the fish's mouth easily. Use landing nets when they aid quick release. Use needle-nose pliers to remove hooks. Never tear a hook from a fish. If the hook is deeply embedded in the fish's throat, snip the line and release the fish, leaving the hook in place. The hook will eventually dissolve.
- Culling fish—the practice of holding live fish for a time, then releasing smaller fish as larger ones are caught—lowers survival rates. The risk increases significantly in warm water. **Please don't cull fish.**
- Be decisive and efficient when determining whether to keep a fish or release it. If the fish you have caught is going to be used for food, the most humane practice is to kill the fish quickly and keep it on ice.

If you have any questions about handling and releasing fish carefully, please call Fisheries Management staff at your local Fish and Wildlife Division office.

CEMA Timelines

NO_x/SO_2 Management Working Group
NO_x/SO_2
Critical acid load mapping (Q1 2002)
Management objectives & plan for NO_x & SO_2 (Q2 2002)
Ozone
Protocols for ozone measurement (Q1 2002)
Protocols for NO_x & VOC measurement (Q4 2002)

Reclamation Working Group
Landscape design performance goals (Q4 2002)
Revise LCCS manual (Q3 2003)
Update re-vegetation manual (Q1 2004)
Guidelines to re-establish biodiversity (Q4 2005)
Guidelines to re-establish wildlife habitat (Q4 2005)

Sustainable Ecosystems Working Group
Determine natural variability & current conditions (Q1 2002)
Assess need for prioritizing management units (Q2 2002)
Determine environmental capacity (Q3 2002)
Determine management objectives (Q4 2004)
Identify resource use expectations (Workshop) (Q2 2002)
Recommend Interim Management Objectives to CEMA
- Priority 1 indicators (Q1 2003)
- Priority 2 indicators (Q1 2003)
- Priority 3 indicators (Q1 2003)

Recommend Management Tools and Options
- Land management zoning (Q1 2003)
- Select management tools & options (Q3 2003)
- Compile monitoring programs (Q4 2003)

Trace Metals and Air Contaminants
Trace Metals
- Recommendations submitted to CEMA (Complete)

Air Contaminants
- Final report for phase 1 – Emission Rates (Q2 2002)
- Begin phase 2 (Dispersion Modelling) & phase 3 (Exposure Risk) (Q2 2002)
- Final report for phase 2/3 (Q4 2002)
- Interim management framework for phase 2/3 (Q1 2003)

Water Working Group
Instream Flow Needs
- Environmental guidelines completed (Q3 2003)
- Management objectives completed (Q1 2004)
- Management system design completed (Q2 2004)

Muskeg River
- Environmental guidelines completed (Q2 2003)
- Management objectives completed (Q3 2003)
- Management system design completed (Q4 2003)

Water Quality
- Environmental guidelines completed (Q1 2003)
- Management objectives completed (Q2 2003)
- Management system design completed (Q3 2003)

CEMA Briefs

CEMA Communications: The committee developed a new logo which was adopted by CEMA and is now being used on all CEMA communications, including this newsletter. The committee has completed the first CEMA annual report, covering 2000 and 2001, which is now available, and have also developed CEMA's public web site which will be launched later in May (www.cemaonline.ca).

Traditional Ecological Knowledge: The Committee has developed a draft plan for the collection of existing TEK, which is currently being circulated to the committee. The committee hopes to finalise the plan shortly and issue requests for proposals for the work later this spring.

NO_x/SO_2 Management Working Group: The 2002 Ozone Measurement Program was approved. Members are expecting the acid deposition mapping report to be out soon.

Reclamation Working Group: The Soils and Vegetation subgroup recently conducted a prioritization exercise of their 60+ issues.

Sustainable Ecosystems Working Group:

Cultural & Historical Resources: Received the Visual Resource Management Report, and are working on archaeological resource use, as well as an historical resource analysis with plans to develop an historical resource model.

Landscape & Biodiversity: Currently testing a process to develop management objectives once work on indicators is complete.

Wildlife & Fish: Designing a campaign to collect information on meat quality from the communities. Members are finalising a report on prioritizing wildlife indicators and have a contract in place for regional habitat mapping and evaluation.

Trace Metals and Air Contaminants Working Group: TMAC presented the recommended trace metals management system to CEMA and to the communities of Fort Chipewyan and Janvier. Members are finalising phase one of the air contaminants work: a regional emissions inventory and ranking of air contaminants.

Water Working Group: Pat Marriott (AENV) and Mike Baker (Albian Sands) are the new co-chairs of the Water Working Group. Members are discussing whether an interim management objective for minimum flow in the lower Athabasca River should be set prior to obtaining results from in-stream flow needs studies.

CALENDAR OF REGIONAL MEETINGS

June, 2002
5 – TMAC, Edmonton
6 – RWG, Fort McMurray
11 – WWG, Fort McMurray
12 – TEEM, Fort McMurray
18 – CEMA OC, Fort McMurray
20 – SEWG Cultural& Historical Resources, Fort McMurray
25 – SEWG Wildlife & Fish, Fort McMurray
28 – RAMP Technical Committee, Fort McMurray

July, 2002
16 – CEMA OC, Fort McMurray

August, 2002
20 – CEMA OC, Fort McMurray
24 – TMAC, Edmonton

September, 2002
4 – RWG, Fort McMurray
11 – SEWG, Fort McMurray
17/18 – CEMA General Meeting, Fort McMurray
19 – SEWG Cultural & Historical Resources, Fort McMurray
24 – RAMP, Fort McMurray
27 – WWG, TBA

Glossary:
CEMA: Cumulative Environmental Management Association
OC: Operating Committee
RAMP: Regional Aquatics Monitoring Program
RWG: Reclamation Working Group (CEMA)
SEWG: Sustainable Ecosystems Working Group (CEMA)
TEEM: Terrestrial Environmental Effects Monitoring Program
TMAC: Trace Metals & Air Contaminants Working Group (CEMA)
WWG: Water Working Group (CEMA)

CEMA STREET These are the People in your Neighbourhood…

Welcome to a new segment of the Sustainable Times! "These are the People in your Neighbourhood" is about getting to know some of the folks involved in the Cumulative Environmental Management Association (CEMA). In this issue meet Judy Smith the Manager of Environment for Oil Sands at Shell Canada Limited, who is no stranger to the oil sands industry. In fact Judy has been involved with almost every oil sands company to date! In 1972, after completing a Master of Science degree in biology at Queen's University, Judy began working as an environmental consultant in Alberta. In 1997, with 25 years of experience in environmental consulting, and almost one third of this work in the oil sands industry, Judy was the natural choice for Shell's new oil sands department. Judy's first project was to oversee the Athabasca Oil Sands Project (AOSP), which received approval in 1999. With work on AOSP underway, Judy is now managing the environmental component of Shell's newly proposed Jack Pine Mine Phase One project.

Despite her busy schedule with the Shell and Albian Sands mining projects, Judy is also heavily involved in CEMA activities. Judy is a co-chair for both the Sustainable Ecosystems Working Group and the NO_x/SO_2 Management Working Group, and sits on many CEMA committees.

"I believe CEMA is a very positive association because it allows all stakeholders to provide input into the regional management objectives and management systems, as well as recommend how the management systems be implemented. I see some challenges for CEMA: the complexity of issues, the need for outside expertise to ensure we have the best information, and the need to establish trust with the stakeholders and the people in the region. I think these are challenges we can meet, but it will take time."

Judy's home life is just as active as her work schedule. In addition to spending time with their two young children, Judy and her husband Peter are in the process of building a new home in the outskirts of Calgary. Judy and Peter are excited about moving to a rural community as they both have an immense love for outdoor activities, including alpine and cross-country skiing, and back country hiking. Judy has also completed five marathons, countless half marathons, and is an avid golfer.❖

This newsletter is a joint effort between Alberta Environment, Alberta Sustainable Resource Development and CEMA. For additional copies of this newsletter or to submit an article, please contact Lisa Zaplachinski (AENV) at 403-297-5937 (lisa.zaplachinski@gov.ab.ca), Brenda Erskine (Suncor) at 780-743-6480 (berskine@suncor.com), or visit the CEMA website at www.cemaonline.ca.