

**Notes from
12th Annual ACWERN Workshop
25-27 October 2007, Sackville NB**

Canadian Wildlife Service: Doug Bliss, Paul Chamberlain, Richard Elliot, Rachel Gautreau, Al Hanson, Peter Hicklin, Andrew Kennedy, MacAloney, Colin MacKinnon, Keith Matt Mahoney, Julie Paquet

Mount Allison University: Diana Hamilton , David Lieske

New Brunswick Department of Natural Resources: Scott Makepeace, Kevin Connor

University of New Brunswick: Hubert Askanas, Kelly Boadway

Travis Clarke, Tony Diamond, Kevin Fraser, Robin Hunewell, Mark MacDonald, Emily McKinnon, Marie-Paul McNutt

Acadia University: Anna Calvert, Rebecca Jeppessen,

Memorial University of Newfoundland: Grant Gardner

Bird Studies Canada: Becky Whittam, Becky Stewart

Atlantic Environmental Research Network: Sheri Faulkner-Jackson

INCIDENTAL TAKE WORKSHOP

AL HANSON (CWS) – PROPOSED REGULATORY APPROACH FOR THE MANAGEMENT OF INCIDENTAL TAKE OF MIGRATORY BIRDS

Incidental take is “the killing of migratory birds, and/or destruction of their nests or eggs, resulting from human activities not intended to destroy nests or kill birds”.

Problem:

- 1) Many birds, eggs and nests are destroyed each year during routine industrial and other activities.
- 2) Destruction of nests, eggs, and migratory birds is prohibited under the Migratory Birds regulations. (Permits, e.g. for scientific purposes are available, but there are none for dealing with incidental take).
- 3) The Migratory Birds Convention Act was updated in 2005 to enable development of regulations that allow exemptions from the existing prohibitions (such as permits).
- 4) Status quo:
 - a) Focused on individual birds, not bird population conservation;
 - b) Minimal enforcement effort has been criticized (CEC Submission on Ontario Logging.) Complaint based enforcement;
 - c) Offers minimal recognition / benefit for engaging in migratory bird conservation;
 - d) Has high risk on non compliance.

Policy Objective

Develop and implement a regulation for the management of incidental take of migratory birds in accordance with the purpose of the Migratory Bird Convention Act, 1994.

Guiding Principles

- 1) *Population conservation*: Provides benefits that support the long-term conservation of migratory bird populations.
- 2) *Clarity*: Clear, effective and enforceable regulations including criteria for exemptions and permits to improve legal certainty for Canadians and Canadian industry.
- 3) *Risk-based*: Provides conditions for approvals based on assessment of risks and impacts on migratory bird populations.
- 4) *Federal/Provincial/Territorial collaboration*: Shared goals and complementary mandates
- 5) *Administrative efficiency / minimize regulatory burden*.

Environment Canada Proposed Regulatory Structure

- 1) Amend the migratory bird regulations prohibition on destroying nests (section 6(a)) to provide for exemptions and permits in circumstances of incidental take.
 - a) Existing prohibitions continue to apply;

- b) Broad high-level enabling regulations – general and applicable to all sectors - exemptions or permits could be granted;
 - c) Regulations would refer to guidelines (minister-approved criteria for exemptions and permits) and allow Minister to specify reporting requirements.
- 2) Strengthen the prohibition to kill (Subsection 5(1)) and provide for exemptions and permits in circumstances of incidental take as above.
 - 3) Amend the current prohibition on hunting without a permit Section 5 (1).
 - 4) Current Regulations define Hunt as: chase, pursue, worry, follow after or on the trail of, lie in wait for, or attempt in any manner to capture, kill, injure or harass a migratory bird, whether or not the migratory bird is captures, killed or injured (MBR section 2. (1).)
 - 5) Amend prohibition to include take and harm. Prior to 1971 the MB regulations included a general prohibition in Sec 5(1). Unless it is otherwise permitted under these regulations to do so, no person shall...” kill hunt injure, take or molest a migratory bird.

Regulatory options available

Practice the mitigation hierarchy of avoid, minimize and compensate.

Three regulatory options would be available:

- 1) Comply with existing regulations, by managing activities to avoid incidental take of migratory birds (the only current option).
- 2) Apply for exemptions based on Best Management Practices (BMP) area-based conservation plans, standard operational procedures etc.
Phased risked/based approach to the development of sectoral activity/based guidelines.
- 3) Apply for permits – where options above do not suffice, or activity of known limited spatial and temporal impact on conditions.

Proposed Framework for Consideration of Exemptions to Incidental Take Prohibition

- 1) Environment Canada sets Migratory Bird population conservation objectives, develops Risk Management Framework, and criteria for permits and exemption;
- 2) EC reviews proposals for exemptions (Habitat Conservation Plans (HCP), Best Management Practices (BMP), Standard Operating Procedures (SOP));
- 3) Environment Canada notifies proponents of decisions and publishes list of exempted activities and associated conditions;
- 4) Proponent self-evaluates applicability of exempted activities;
- 5) Proponent complies with conditions for exemptions and self-identifies to Environment Canada prior to initiation of the activity.

Proposed regulatory timelines

- 1) Development and approval of regulatory strategy (Fall/Winter 2007);

- 2) Publication of regulatory strategy (Winter 2007/2008);
- 3) Consultation on regulatory strategy (Spring 2008);
- 4) Develop regulatory package;
 - drafting instructions, business case, Regulatory Impact Assessment Statement (RIAS), compliance strategy, performance management plan, draft regulations.
- 5) Publication in Canada Gazette I, December 2008;
- 6) Publication in Canada Gazette II, March 2009.

Consultation in support of Incidental Take (IT)

- 1) Other Government Departments, provinces, territories, First Nations. May need to negotiate agreements to integrate IT requirements into existing regulations.
- 2) Industries/resource sectors – some playing an active role, some not yet contacted.
- 3) Environmental Non-Governmental Organisation's – need assurance that bird conservation will be outcome of new approach
- 4) General public – requires compliance promotion.

Tools to support conservation objective

- 1) Consolidated bird conservation priorities and recommendations in the form of Bird Conservation Region (BCR) plans (North American Bird Conservation Initiative, NABCI));
- 2) Best management practices or standard operating procedures;
- 3) Standards for habitat replacement or other compensation;
- 4) Risk management framework that helps:
 - a) Predict the effect of any activity;
 - b) Assess the risk to bird populations, and;
 - c) Select appropriate mitigation approaches (conditions of exemption);
- 5) Adaptive management framework;
 - a) Bird and habitat monitoring to assess conservation progress;
 - b) Contrast to the No Surprises Rule of US Endangered Species Act.

Tools to support implementation

- 1) Application process to obtain permit/exemption;
- 2) Web site with information on beneficial management practices, , interactive;
- 3) Review of applications to assess level of risk and required conditions;
- 4) Approval process;
- 5) Compliance monitoring;
- 6) Enforcement.

This is a priority for Environment Canada, and resources will be reallocated to make it happen.

All agencies and provinces will be contacted during the consultative process.

2) SCOTT MAKEPEACE – NSDNR - EFFECTS OF FORESTRY ACTIVITIES ON BIRDS

“In New Brunswick half of the forest is crown land, and the forestry industry is a high proportion of the Gross Domestic Product (GDP).”

Forest context:

- 1) 40% of Canada is treed;
- 2) 85% of New Brunswick is forested;
- 3) 210+ bird species;
- 4) 109 bird species in NB forests.

The dynamic forest

- 1) Always changing: fire, wind, gap dynamics (old age, disease, fungus), climate change;
- 2) Forestry: silviculture, harvesting, road building, climate change.

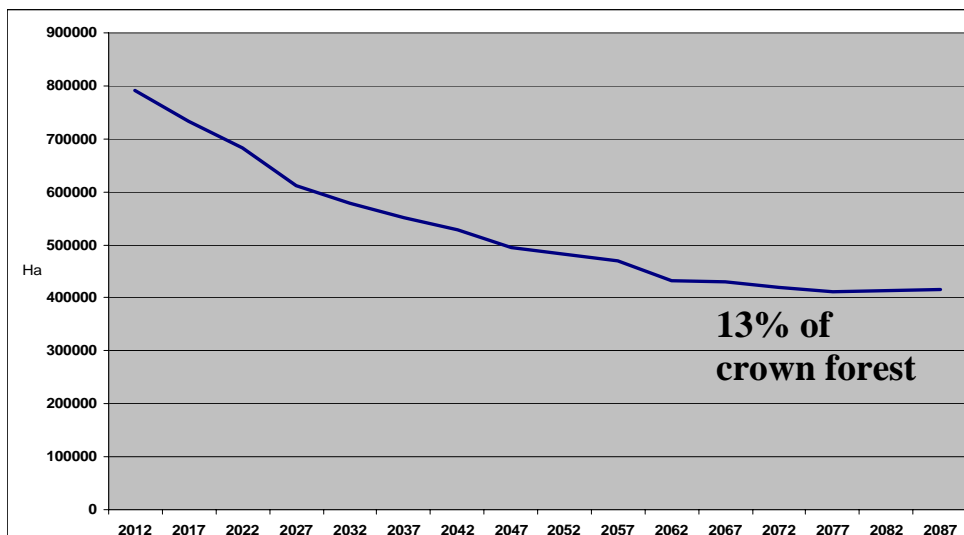
Impacts of forestry

- 1) Influences the abundance and distribution of habitat;
- 2) Occurs at the territory and at the landscape scale;
- 3) Rate of change is more frequent than occurs naturally.

Issues

- 1) Reduction in amounts of old forest;
- 2) Patch-sizes reduced;
- 3) Landscape permeability reduced;
- 4) More managed forests;
- 5) Changes in forest composition.

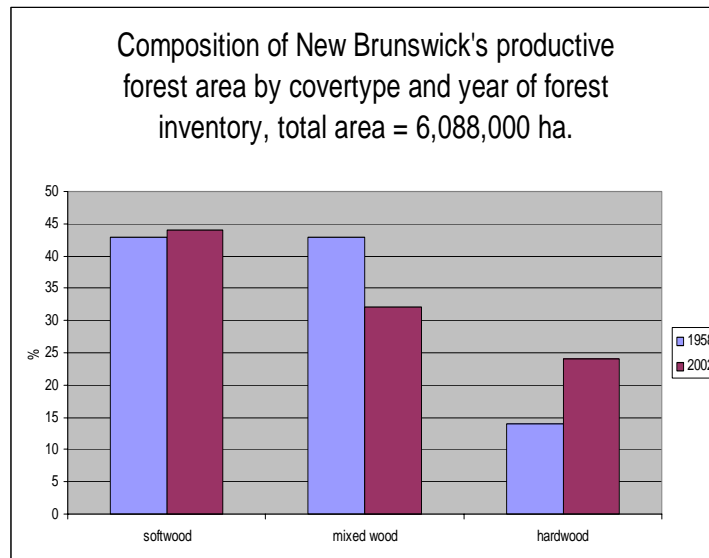
“Projected supply of older softwood forest habitat on New Brunswick crown land: Goes from 800000 Ha now, and will be reduced to approx 410000 Ha in 2077. 13% of crowned forests will be older softwood forest”.



“On crown lands, the government is responsible for setting objectives. Government balances forestry industry needs and habitat conservation needs. The New Brunswick economy is heavily reliant on the forestry industry. Reducing forestry activities by protecting additional forests could result in mill shutdowns and great uncertainty.”

Declines in bird habitat do result in bird population declines: e.g. Blackburnian Warbler.

The composition of New Brunswick forests is changing. Softwood has hardly changed. Mixedwood has declined greatly. ‘Hardwood’ as a class of trees has increased. However cutting has favoured short-lived hardwood species (birch and poplar thrive on past clear-cut areas) compared to maple, beech, yellow birch)



“The Forest Management plan in New Brunswick does not include climate change, fires, site change (denitrification, water tables etc.), etc. The short interval between Forest Management plans (5 years is supposed to account for these types of factors).”

Challenges

- 1) Poorly known habitat relationships;

- 2) What are desired population levels?
- 3) What is the forest composition (s) which results in the maintenance of desired bird populations?
- 4) Influencing forest change?

Incidental Take

- 1) Many forestry related activities result in the destruction of migratory bird nests, eggs and individuals.
- 2) What is the impact? Does it influence populations?

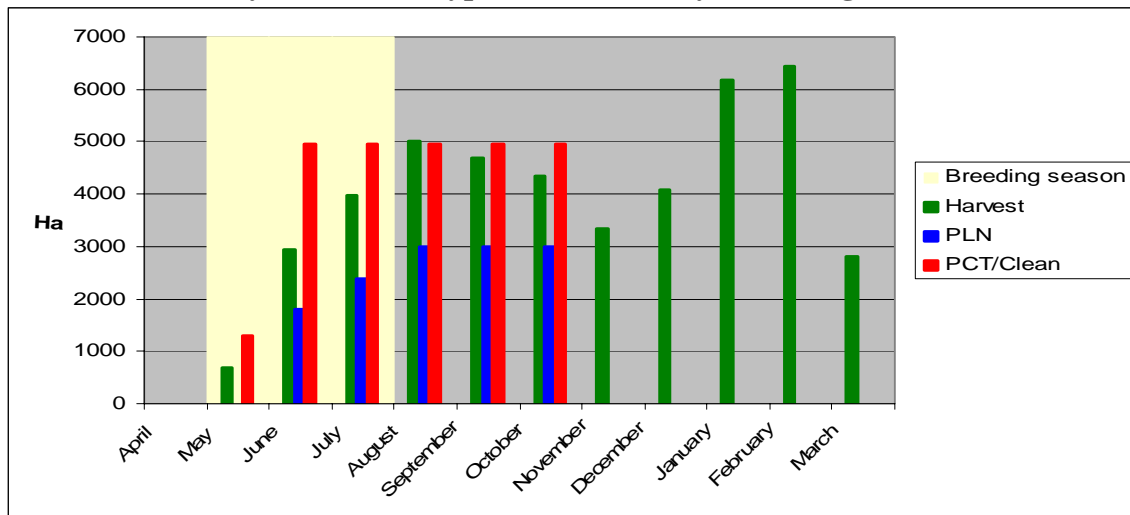
What is the scale of the issue?

- 1) Depends on the amount of area treated during the breeding season;
- 2) The kind of disturbance to the site;
- 3) Types of habitat involved.

Amount of area treated

- 1) There is a lot of harvesting and silviculture conducted by the forest industry;
- 2) Approx. 45,000 ha cut and 30,000 ha planted and thinned each year, on Crown land.

Area Treated by Treatment Type and Month, 5 year average, All Crown Land



Breeding season treatment levels

- Harvest 7600 ha
- Plantation (PLN) 4200 ha
- Pre-commercial Thinning (PCT) 11220 ha

Impacts

From previous slides:

- 1) Currently there are approx. 800,000 ha of old softwood forest;
- 2) Approx. 7600 ha are harvested during the breeding season;
- 3) This equates to incidental take on 0.95 % of available breeding season forest (for old forest associated bird species).

Conclusion

Incidental take is occurring. The role it plays in regulating bird populations may be minimal.

3) TONY DIAMOND -UNB - WHAT HAVE WE LEARNED FROM 12 YEARS' WORK ON FOREST BIRDS AT UNB?

What is a patch? For a particular species, how are they looking at the landscape?

Major Research Questions

1. Reality of landscape vs. local effects, in largely-forested landscapes;
 2. Does “presence” reflect habitat quality *a la* Van Horne? Need for *fitness components* (demographic variables);
 3. “Forest” does not equal “habitat”; few species use all forest types/ages. Need for *species-centered* definition of habitat: “bird’s-eye view” of the landscape;
 4. Detecting effects of fragmentation when it is *confounded* with habitat loss.
-
1. Local vs. landscape habitat
 - a) Local important in all species; for many, landscape is too (relative strengths vary).
 - b) Example: cavity-nesters’ presence best explained by local habitat, except for Downy Woodpeckers and Northern Flickers, where clear-cuts within 300 or 1000m are important.
 2. Does “presence” reflect habitat quality *a la* Van Horne? Need for *fitness components* (demographic variables).
 - a) Often does not: productivity and incidence (+/-) predicted by different habitat variables.
 - b) Survival of Blackburnian Warblers varies with habitat in landscape (local for second year birds (SY’s), landscape for after second year birds (ASY’s)).
 - c) SO presence/abundance inadequate measures of habitat quality, even in contiguous forest.
 3. Does “forest” equal “habitat”
 - a) For NO species is “forest” an appropriate description of habitat; ALL prefer some kinds (species, ages etc.) to others.
 - b) Example: Blackburnian Warblers need “mixedwood” forest, but not as defined by Department of Natural Resources (DNR) forest inventory classes; as defined by Blackburnian Warbler, certain range of large conifers and large hardwoods.
 - c) Example: cavity-nesters’ “habitat” defined by need for snags for nesting BUT (a) most cavities in live trees, not “snags”, AND (b) trees used for nesting differ from those used for feeding.

4. Detecting fragmentation effects

- a) Following from (3), these are detectable – often with thresholds – only when species-specific habitats are recognized. Most are obscured by using broad forest types as “habitat”
- b) Especially important to quantify *thresholds* – addresses managers’ need to know “how much” habitat to provide

Take home message

- a) To assess impacts of any management on forest birds, we *MUST* determine the species-specific habitat and use that in our models
- b) Only way to get “bird’s-eye view” of landscape

USE Species-Specific Habitat models!

4) EMILY ANNE MCKINNON (UNB) - FORESTRY BEST MANAGEMENT PRACTICES TO COMPENSATE FOR INCIDENTAL TAKE

What does “incidental take” mean for the birds?

- 1) Direct effect: nest/individuals destroyed;
- 2) Indirect effect”: habitat rendered unsuitable & fragmented (potential for compensation).

How could the forestry industry mitigate these effects?

- 1) Direct effect: reduce the impact by operating in the non-breeding season (winter);
- 2) Indirect effect:
Habitat and structural RETENTION;
Habitat CREATION.

Direct effect mitigation

- 1) Changing timing of harvesting would be difficult, if not impossible;
- 2) Good for birds, but harvesting during winter might be bad for other taxa, e.g. deer, small mammals & other bird species.

Indirect effects mitigation

- 1) Already practiced at some levels by many companies (leaving ‘wildlife’ trees);
- 2) Part of sustainable forest management;
- 3) Allows industry to harvest while maintaining habitat for many taxa.

Principles for managing for biodiversity:

- 1) Maintenance of connectivity;
- 2) Maintenance of landscape heterogeneity;
- 3) Maintenance of stand complexity;
- 4) Maintenance of intact aquatic ecosystems;
- 5) Risk spreading.

Ideas for management guidelines (from conference)

- 1) Structural retention: snags, legacy trees, large logs;
- 2) Patch-cuts or Strip-cuts, NOT clear-cuts (at least not on a big scale);
- 3) Single-tree selection harvesting;
- 4) Mixed species forests – reduce BOREALISATION;
- 5) Mature forests (currently declining approx 2%/year!);
-30% in NB should be older than 60 yrs
- 6) Uneven-aged management.

Structural retention: big dead trees standing & fallen

Benefits to managers

- 1) FSC certification;
- 2) Potential for biomass harvest for energy (not spp. Specific);
- 3) Boreal species are expensive to manage (pesticides);
- 4) Spruce & fir more prone to budworm than natural Acadian forest species;
- 5) Clean conscience?

Benefits to the birds

- 1) Heterogeneous habitat, therefore more ecological niches;
- 2) Potential for dispersal if disturbed into connected patches;
- 3) Encourages SOURCES instead of SINKS;
- 4) Quality breeding ground mitigating wintering ground habitat loss? (Kevin's thesis!)

“To effect change, you have to follow the money trail – enforce Forest Stewardship Council (FSC) certification. Support green certification.”

Conclusions

- 1) Adaptive management is key;
- 2) Industry must support research on their lands by universities;
- 3) Sustainable forestry is the ONLY forestry that will work in the future.

5) KEVIN FRASER - UNB - THE CHALLENGE OF MANAGING UNPOPULAR, SHIFTY HABITATS

Conserving old growth habitat is less of a hard sell than conserving undefined changing habitats. They are viewed as disturbed shifting landscapes. (Ex: useful for Common Yellowthroat).

Golden-winged Warblers like early successional stage habitats. When the habitat changes (matures) the Golden-winged Warblers go elsewhere. So how do you conserve habitat for the Golden-winged Warblers. This is a difficult management question.

Concept of floating reserves.

Floating reserves, what would we need to know first?

1) Is there a peak in breeding success at a particular successional stage? For what species?

TYPE OF SPECIES IN RESERVE AND OPTIMUM AGE OF STAND

2) Knowledge of dispersal within and between years: How far do birds go when an area is disturbed?

DISTANCE BETWEEN FLOATING RESERVES

3) Does patch-size in a disturbed matrix affect presence/absence and productivity?

THE SIZE OF EACH FLOATING RESERVE

GENERAL DISCUSSION ON INCIDENTAL TAKE

- Possible compensation for Incidental Take: Floating reserve with tracking.
- It is not necessary to change what the forestry industries are doing, but how they are doing it.
- Recommendation for BITH: no thinning in June where BITH are known to breed.
- To implement IT in the short term we will have to create forest management plans based on current limited information and professional judgement. Concurrently identify specific research needs and initiate projects. It is advantageous to formalise the best judgement and use as first steps. It is also useful to do adaptive management.
- We need to figure out what are the components we need to understand big picture.
- It is important to not just look at the birds while they are nesting/breeding – we must look at the landscape level. For example: species nesting in old growth may move into early successional areas with young.
- Scott Makepeace: setting habitat objectives is better than generic beneficial management practices.
- It is important to not forget about certification organisations and their influence in the process.
- Integrating best forest management practices with birds-eye view. Greatly enhance foresters view. Birds-eye view plus forester's view equals better understanding & planning tools.

IMPLICATIONS OF THE LOSS OF THE TERN COLONY FROM MACHIAS SEAL ISLAND WORKSHOP

1) ANDREW BOYNE - SPECIES AT RISK CWS/AR - THE REGIONAL PERSPECTIVE ON TERN POPULATIONS

Status of terns in Atlantic Canada

1999 Population Status - Baseline

Most recent surveys at the time: Nova Scotia (1995), Prince Edward Island (1987), New Brunswick (1983), and Newfoundland & Labrador (1973).

CWS decided they would survey every 5 year (NFLD over 3 years) in a staggered manner. In 2007, the 2nd 3 year survey of was Newfoundland was completed.

Nova Scotia

- 1) Has the best long term data: 1971 (though poor), 83-84 have partial surveys, and in 1995 NSDNR started surveying every 4 years.
- 2) Generally, the population seems healthier than in 1985. In 1983 there were 15 colonies, and in 1995 there were over 100 colonies.

Note: Only over 50% of the colonies remain in the same location over 4 years. Many colonies relocate. Only 2 actually stayed in the same location over the 2 survey cycles.

Prince Edward Island

There is PEI data from 1966 to 2004 (last survey: survey years 1966 1976 1984, 2000, 2002, and 2004).

New Brunswick

There was a survey in 1983, then 2000 & 2005. The population appears relatively stable, although the colony numbers are decreasing.

Newfoundland and Labrador

Surveys in 1973, 2000-2002, 2005-2007.

Population appears relatively stable (1973 Tony Lock survey may not be comparable with other surveys due to timing and man power).

**For the most part, only Common Terns can be found in the Gulf of St-Lawrence
(only 2 or 3 ARTE pairs found)**

- 1) Prince Edward Island Gulf shore has mostly Common Terns;
- 2) New Brunswick Gulf shore has mostly Common Terns;
- 3) Newfoundland and Labrador have 60% Common Terns, 40% Arctic Terns.

Recent status of terns in Atlantic Canada

- 46348 (1999-2002)
- 46403 (2004-2007)

	1999-2002	Nests	2004-2007	Nests
Prince Edward Island	1999	287	2004	738
Nova Scotia mainland	1999	5483	2007	???

“Data suggests that over all, terns appear to be stable in Atlantic Canada although the number of colonies appears to be decreasing.”

Status of terns in the Gulf of Maine

1984-2006: One survey in 1984, then surveys from 1999 to 2006.
Slight increase in Common Terns, Arctic Terns are stable.

Status of gulls in Atlantic Canada

Gulls in Prince Edward Island

Great decrease in large *Larus* gulls between 1986 & 1999
Ring-billed Gull increase

Gulls in the Gulf of St. Lawrence

Stable Great Black-backed Gull
Herring Gull decrease

Gulls in the Bay of Fundy

Great Black-backed Gulls are stable
Herring Gulls have slightly decreased and ring-billed Gulls are appearing

Number of gulls in Nova Scotia in the 2002 study area in 1971, 1987, 2002

Great Black-backed Gulls increase in the late 1980's and then decrease in 2002.
Herring Gulls increase in late 1980's and then decrease slightly in 2002.

“Data suggest overall that there are fewer gulls breeding in the Maritimes, particularly Herring Gulls.”

2) COLIN MACKINNON, ANDREW KENNEDY - HABITAT PROGRAM CWS/AR - MACHIAS SEAL ISLAND MIGRATORY BIRD SANCTUARY – HISTORICAL CONTEXT

Machias Seal Island light station was established in 1832

Machias Seal Island Migratory Bird Sanctuary

- 1) A light station since 1832
- 2) A Migratory Bird Sanctuary since 1944
- 3) Entry restricted since 1982
- 4) Entry permit required 1985

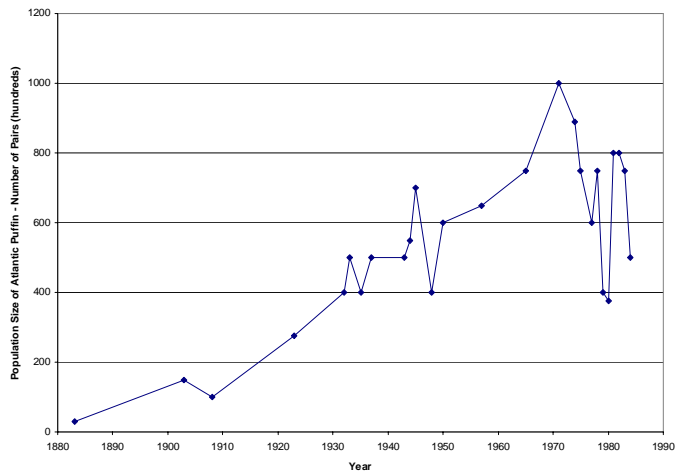
Canada vs. US – boundary line issue

Visitor access (Canada Labour Code II)

- 1) Summer caretaker since 1973
- 2) Entry permit required – June & July
- 3) 3 charter boat operators (1 CDN, 2 US)
- 4) 30 persons/day
- 5) ~1,200 visitors/summer

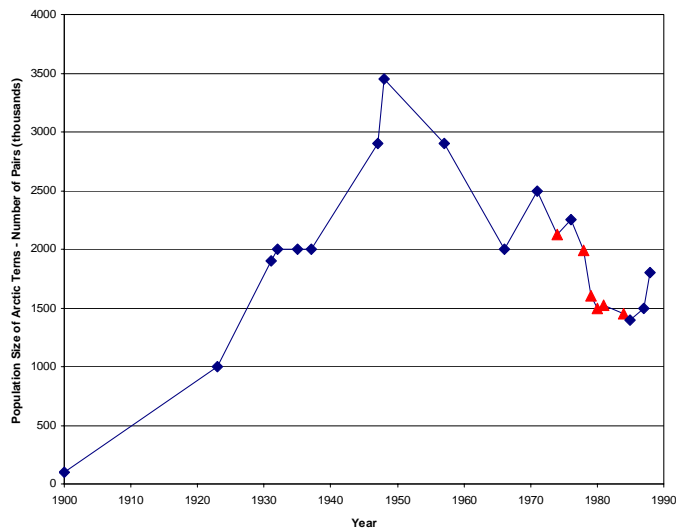
ATLANTIC PUFFIN (PAIRS) ON MSI FROM 1884 to 1984

Figure 2. History of Atlantic Puffin on Machias Seal Island MBS



TERN NUMBERS (PAIRS) ON MSI FROM 1900 to 1984

Figure 1. History of Arctic Terns on Machias Seal Island MBS



“In 1887, a party of men on one trip, mainly visiting islands in Jericho and Penobscot Bay, killed 1134 terns (Common and some Arctics), which were sold for millinery purposes at 30 cents each, making a total of \$340 for the trip.” (Palmer, 1949)
<http://www.hanleymillinery.com/gallery.htm>

What is happening to the terns?

Capt. Benson relates to R. Tufts that “no young were raised that year (1944) and the birds left in mid summer”. This was attributed to gull predation and a scarcity of food. (CWS file).

3) TONY DIAMOND - UNB - THE LOSS OF TERNS FROM MSI – SUMMARY OF TRENDS AND ISSUES

Biological trends recorded by ACWERN 1994-2007

- 1) On MSI, terns are censused every 2 yrs ;
- 2) There are approximately 2000 pairs of Arctic Terns & 1000 pairs of Common Terns;
- 3) It is the largest Arctic Tern colony in the Gulf of Maine/ Bay of Fundy;
- 4) Puffins & Razorbills are censused only once each.

Survival and movement

- 1) Metapopulations: survival & movements of Puffins, Razorbills, and Arctic Terns take place among major Gulf of Maine colonies;
- 2) Kate Devlin’s ARTE population viability analysis predicted extirpation of MSI colony, lower adult survival, and lower productivity;
- 3) Dispersal outside the study area?

Changes in diet (fed to chicks)

- 1) Juvenile (o-group) herring predominated until 2000;
- 2) Productivity of terns correlated with condition (fat content) of herring;
- 3) Spike of Sandlance in 2001;
- 4) Herring has continued to decline since, and has been replaced by krill and larval fish (hake is more or less constant).

Slide of herring catch by year (1995-2007) for all 4 species:

Razorbills were able to get Herring longer than other species because they dive deeper, but by 2007, even Razorbills were no longer catching herring.

Seabird productivity (fledgers/nest)

- 1) All Species more or less constant until 2003;
- 2) Terns crashed in 2004 (2004 crash was related to bad weather, poor food, gull predation), zero productivity in 2005, abandoned in 2006-2007;

- 3) In 2004, *Auks* were fine, 2006 drop in Atlantic Puffin productivity, 2007 drop in Razorbill productivity;
- 4) There is now more gull predation on burrow nesting *Alcids* (they have lost their defensive umbrella of terns).

“Some of the terns went to various sites in Gulf of Maine US islands (resighting of banded birds). However, the extras on other islands do not add up to the total MSI population. Where are the others??”

Atlantic Puffin fledging dates

1996, 2000, 2004, 2005 are late years. There appears to be a trend to fledge later. For Atlantic Puffins, there appears to be no relation between fledgling date and fledgling mass.

Oceanographic changes & changes in food

- 1) Sea surface temperature: no obvious trends from measurements at St. Andrews;
- 2) Salinity: no obvious trends from measurements at St. Andrews.

Other issues: Disturbance – tourism and research

- 1) 28 tourists/day quota June 1 – July 31 – no regulations other times;
- 2) 2-3 researchers early may to late august;
- 3) Fishing: increased lobstering activity in the “grey zone”;
- 4) Gull predation has increased since 2000;
 - o Management: no lethal gull control since 2000.

4) KELLY BOADWAY –UNB - CHANGES IN MANAGEMENT PRACTICES (GULL CONTROL) AND EFFECTS OF TOURISM

Tourism

Kelly Boadway: There have been 2 BSC Hons on the disturbance effects of tourism on MSI (Morrison (1996), Gagnon (2003)). Both theses find no effect of tourism on tern productivity.

On Kelly’s research Island there is no difference in productivity between the 2 colonies, one which was observed a lot, and the other which was largely undisturbed.

Though tourists did not affect tern productivity on MSI, it is important to note that they are restricted and controlled in their movement, and that is key to success. Many measures are taken to mitigate effects of tourism on terns.

Travis Clarke lists human disturbance on MSI

- 1) **Boat traffic: all day long around the island**
- 2) **Coast guard presence on the island**
- 3) **Year round presence on the island – helicopter**
- 4) **A lot of activity: rebuilding the wharf twice**
- 5) **Garbage removal policy: burning**
- 6) **Student research presence**

7) Wind turbine is left running throughout the breeding season

Kevin Davidson: There has been a lot of human disturbance over the last 200 years – there used to be families with sheep & dogs on the island.

Gulls

Kelly Boadway: Gulls are affected by human presence – tourism decreases gull presence. Gull predation rates have increased since 2000 when lethal predator control ceased. Gulls are subsidised predators. Lobster fishermen dump bait around island and artificially sustain the gull population around MSI.

Kelly suggests that there should be lethal gull control on MSI.

Fishermen should be informed of the effects of dumping bait.

Colin MacKinnon: Gull control on MSI began in the 1970's: 5 gulls were killed. In 1984, the CWS warden poisoned 21 adults & juveniles. Since then, wardens have had a 22 calibre rifle to scare, and only 1 or 2 adults were killed.

Colin MacKinnon: In 2000 and 2001, the Federal Firearm Act and the Canada Labour Code changed, making managers personally responsible for their employees. This means that if there was to be an accident involving a firearm on the island, the manager would be held responsible.

Colin MacKinnon: Scare pistols with bangers were tried, but gulls habituated. They also tried to focus on the problem gulls, with no success. This year, a trained ranger removed 6 gulls in 5 days in the spring.

Kevin Davidson: Lobster fishing has existed in the Bay of Fundy for 155 yrs.

Fishing has greatly increased in the grey zone lately due to sovereignty issues. The consolidation of fishing plants and landfill sites is certainly having an effect. Maybe now things are returning to normal? These are tough times for gulls; there are too many gulls and too little food available, so they may be turning to other sources: e.g. terns.

Andrew Boyne: Country Island is a non-lethal gull control scare technique success story.

Andrew Boyne: Near Country Island, many gulls feed behind lobster boats (banded gulls from nearby islands are regularly seen by fishermen behind their boats).

Travis Clarke: On Machias Seal Island, they have been destroying nests, on gull rock too. Last year 50 eggs/nests were found on gull rock, a great increase from the 2 or 3 nests found in previous years.

Gull specialists – Tony not convinced by evidence.

There should be increased gull disturbance on Machias Seal Island, including many daily foot patrols around the island, nest destruction, visits to nearby gull rock to destroy nests, and possibly scare pistol shots.

5) ROBIN HUNNEWELL -UNB - CLIMACTIC & OCEANOGRAPHIC CHANGE

The North Atlantic Oscillation (NAO) caused the coupled slope water system. With warm water heading up the continental shelf towards the Gulf of St-Lawrence, and the Labrador current going down.

In the 1960's, the North Atlantic Oscillation was in a low index period, with the slope extending lower than normal. From the 1970's to 1990's, the NAO was within normal ranges. Between 1995 and 1999, there was some odd activity. In 1996 there was a NAO reversal: The Labrador Current dropped (biggest drop this century) flowing fresh cool water into the Gulf of Maine.

Scientists are trying to tease out how all of this affects zooplankton, looking at time lags between the behaviour of the NAO and ensuing effects on zooplankton abundance (woods hole, studies around GOM).

A few years after the 1996 NAO reversal, cool water in the Gulf of Maine replaced the warm water in Atlantic Current. Following this, zooplankton in the GOM shifted to cold water species.

Zooplankton populations are reliant on constant advection. Shelf populations could not resupply themselves if not reinforced by the basin populations. In spring, there is an increased flow of water from the Scotian Shelf into the Gulf of Maine. This water carries diapausing plankton.

The 1996 NAO reversal meant that a big slug of cool water entered the Gulf of Maine. Why would that affect *Calanus*? It is possible that the cold slug of water cut off the deep basin source of diapausing *Calanus* to the shelf populations. Currently it seems that they have bounced back and seem to be in a high index phase.

It is important to understand the NAO and how it affects circulation patterns in the North Atlantic and ensuing effects on plankton.

Calanus is positively correlated with the NAO in the western Atlantic (Eastern Canada & US). In the eastern Atlantic (North Sea) it seems reversed. *Calanus* populations increase when the NAO drops, allowing cool water to come from Norwegian Shelf and flooding the North Sea area. For that reason, *Calanus* has been showing constant negative trends, and therefore has been decreasing in the North Sea.

The last few decades and phalaropes

Phalaropes feed on *Calanus*. Phalarope populations shifted in the Bay of Fundy in the 1990's. *Calanus* is also a major food for herring. So what affects *Calanus*, should affect the herring.

OPEN DISCUSSION ON THE IMPLICATIONS OF THE LOSS OF THE TERN COLONY FROM MACHIAS SEAL ISLAND

- ✓ **Factors affecting the terns:**
 - 1) Food supply of birds;
 - 2) Gull predation;
 - 3) Human disturbance;
 - 4) Climactic change.
- All of these are interacting to create the situation we see on MSI.
- Gulls have been having a much greater effect on burrow nesting (*Alcids*) on MSI. No more egg-laying in the open. There has also been a decrease in eider numbers.
- **Body condition of adult terns:** Tony has a gut feeling that terns are much less likely to attack gulls when they are in poor condition (tern hits on the warden study). He thinks that on the year when terns are light (low body mass), the number of defensive hits go down. Tony has weight data and could test this hypothesis.
- **Body condition of gulls:** This data is available from AVC
- **Lobster fishing:** How many boats are actually fishing around the island in 1997-98? Lobster trap density was high in 2007.
- **Gull control:** Perimeter walks around the island to scare gulls. Note: Mattinicus rock had bad year due to gull predation – in spite of gull control measures. Gull predation has also increased at Country Island. Also, in past years Mattinicus Seal Island terns have started bringing in larval fish for the first time.
- Doug Bliss: CWS has to justify its actions to the public. Lethal gull control can only be used if it is completely justified and all other options have been tried.
- Andrew Boyne: Have all options been exhausted – from yelling boo to poisoning?
- In 2007, the warden walked around with a sling shot, pellet gun and scare gun. In spite of all of this, gull predation continued to increased, and extended to the *Alcids*.
- Look into fisheries: increase in lobster fisheries around the island? Look into food quality. Tony's group is meeting with DFO in November regarding the Herring fishery.
- There is a 1km exclusion zone around the Island, though it has never been enforced.
- Tony: in the past, most problem gulls were non-breeding adult plumage Herring Gulls. Now, there are breeding adult plumage gulls (mostly HEGU).

- UNB students collected the gull eggs from 2007, figure out what species they are.
- **Tony Diamond: Next year on MSI: 2 graduate students (assuming funding) + 1 assistant. This allows room for 1 person to study or control gulls.**
 - **It would be possible to trap and colour band birds on gull rock. Question: Do you watch or try to control?**
 - **It is necessary to get information in order to guide policy decisions.**
 - **Tony Diamond: Puffin fledglings were in very good condition 2007, though fledging success was lower. Ian Jones found that when the puffins were in bad condition they would come to the mouth of the burrow. This makes them more vulnerable to predation.**
 - **Kevin Davidson: Herring stock biomass is the lowest it's been in 30 years. They have cut the purse seining quota in the Bay of Fundy. There is also a quota on the weir fishery, indicating some concern.**
 - **Whether or not the herring stock is a component on the MSI tern population disappearance is not known.**
 - **Discussion regarding monofilament strung across tern colonies to protect from gulls: Has been found ineffective.**
 - **Richard Elliot concludes: Follow aggressive non-lethal protocol on Gull Rock & Machias Seal Island using Country Island model– resources permitting! Include CCG resources and ACWERN. (Kevin wonders if all the lethal control in US is moving gulls to MSI... however...answer: Same # of gulls on MSI as 14 yrs ago... it is behavioural change).**
 - **Richard Elliot: First review last year's control: examine the gulls at AVC, interview Don Colpitts – after this decide regarding gull control next year.**
 - **Next – review lobster fishery & oceanography & herring fishery...**
 - **We must understand (not guess) before we talk to DFO and US**
 - **Tony – contact USA and get the info**
 - **Tony idea – colour band the Gull Rock gulls and figure out what they eat (chicks vs. lobster bait) track using isotopes... how much do you need to know?**
 - **Richard – active gull control before terns arrive still leaves gulls to study on Gull Rock.**