For over 20 years, sustainable forestry has been using indicators to track progress and manage for sustainability. Forest certification has relied heavily on practice-based programs to measure, verify, and adjust to improve the sustainability of forest operations. Although widely supported, forest certification still leaves something to be desired because it does not directly measure and report on outcomes, the real proof of sustainability. Forestry water quality programs in Canada and the U.S. have also focused on developing BMPs and related practice-based indicators which now have a large body of science to support them. In many arenas, outcome-based management has gained in recent years, including: education, social welfare programs, agriculture, and forestry. Remarkably, however, there are only two places where outcome-based forestry is applied on the ground. In this talk, I will discuss the considerations for using outcome-based forestry for conserving late-successional and old-growth forests in the Acadian Forest Region.

Key topics

- What is outcome-based forestry?
- An example: Maine Forest Service's program
- Key considerations for old-growth

I will be speaking on three key topics: a definition of outcome-based forestry and some of its key success factors, a presentation of highlights gleaned about Maine's outcome-based forestry program, and key considerations for using an outcome based approach for addressing old-growth conservation in the context of a managed forest landscape.

Outcome-based forestry

What does it mean?

…achieving forest sustainability goal(s) through an adaptive process of performance measurement (the "outcome"), verification, and improvement.

(State of Maine)…' "Outcome-based forest policy" means a science-based, voluntary process to achieve agreed-upon economic, environmental and social outcomes in the State's forest, as an alternative to prescriptive regulation, demonstrating measurable progress towards achieving statewide sustainability goals and allowing landowners to use creativity and flexibility to achieve objectives, while providing for the conservation of public trust resources and the public values of forests.'

I searched the web for about an hour trying to find a good definition of outcome-based forestry. Remarkably the only definition that I found was created by the Maine Forest Service that focuses on how it works and not very much about what it is. By looking at literature in other arenas, I pulled together my own definition which focuses on the notion of an adaptive process of measurement, verification, and improvement. This is similar to notions of ecosystem management, adaptive management, strategic planning, and cycle of business development. It means going beyond defining the sought after outcomes and developing a system of continuous improvement to ensure outcomes and targets are actually achieved.

Outcome-based forestry

Focuses on the "what", also called

- Evidenced-based
- Results-based
- Management by results
- Accountability systems
- Performance-based
- Data-driven

Contrasts with "how-to" approaches

- Input-based
- Practice-based

Outcome based management is different from practice-based management. Outcome based management focuses on the what or the goal. In contrast, practice-based management focuses on "how to" get to the goal. There are a number of terms related to the notion of outcome-based management, most commonly of which is results-based.

When science matures: Is it an outcome or a practice, or both?

Practice	Outcome
Structural requirements	Large trees and snags
Water buffers (defined widths)	Water temp. and sediment load

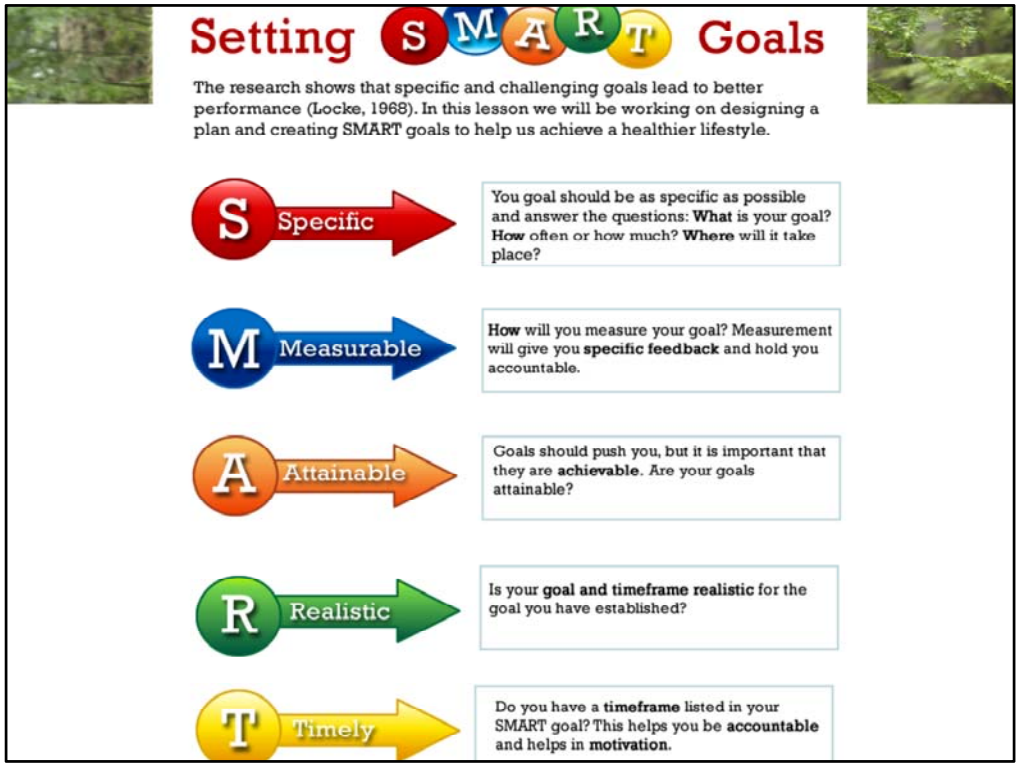
Although it seems simple to distinguish outcome-based and practice-based management, sometimes they become one and the same. For example, original standards for stream buffers were based on expert judgment. Now, research has confirmed with good precision how to best apply this practice to keep stream temperatures cool for cold-water fisheries and keep water clean.

Key success factors[1]

- Industries with a high compliance culture
- Goals/objectives are specific, measurable (e.g., SMART), and enforceable
- Timelines are appropriate (allowing for innovation but are not too permissive)
- Risks to key values are low to medium

[1]Natural Resources Canada. 2013. Literature Review to Assess the Relevance of Outcome-Based Regulations to Innovation. Natural Resources Canada, CanmetMINING-Green Mining Initiative, Minerals and Metals Sector. Ottawa, Canada.

I found this document that highlight four key factors that help outcome-based management system succeed. These include: sectors that have high compliance culture, systems that set goals that are specific, measureable (e.g., SMART, more on this in a minute), and enforceable; appropriate timelines that allow for flexibility to test and develop innovative solutions but that are not too permissive; and arenas where risk to key values are low or medium.



What do I mean by SMART goals? SMART goals are specific, measureable, attainable, realistic, and timely. This is a widely used framework for identifying targets. While this graphic was from a weight reduction program, it wording is largely applicable to any outcome-base management system. Failure to have SMART targets can undermine any outcome-based program.

Key elements for managing accountability[2]

- Outcomes that clearly align to program goals
- Indicators to measure whether outcomes have been achieved
- Performance standards or benchmarks to assess progress
- Monitoring program to regularly obtain indicator data
- Periodic analysis of data for internal decision making and public reporting

[2]Horsch, K. 1996. Results-Based Accountability Systems: Opportunities and Challenges. NCLS & Harvard Family Research Project Brief Series: ELO Research, Policy, and Practice Vol. 2, No. 1). Retrieved from http://www.hfrp.org/evaluation/the-evaluation-exchange/issue-archive/results-based-accountability-1/results-based-accountability-systems-opportunities-and-challenges.

There are also consideration for managing the accountability, a key aspect that is essential to the success of outcome-based programs. It requires outcomes linked to goals and indicator to measure whether outcomes and benchmarks have been achieved. This requires a monitoring program with reporting to support making changes in direction and provide transparency necessary for credibility.

Outcome-based vs. practice based

Program attribute	Outcome-based	Practice-based
Flexibility	High	Low
Fostering innovation	High	Mod
Compliance costs (to biz)	Low	High
Development costs (to gov't.)	Low	Mod
Enforcement costs (to gov't.)	High	Low
Effectiveness when impacts poorly understood	Low	Mod
Need for adaptive process	High	Low
Level of uncertainty for landowners	High	Low
Potential for unintended consequences	High	Mod

Outcome-based management contrasts greatly with practices-based systems. Aside from the obvious contrasts, the biggest impact is on responsibility and burden of costs. Practices-based systems are relatively low cost to monitor and enforce. In contrast, outcome-based systems require costly verification and enforce systems that are generally the burden of government. This is problematic because government budgets are declining and so it is likely impossible for government to afford to provide consistent and adequate verification.

Hence, while outcome-based systems can have many benefits there can also be limitations that can undermine the system.

An example: Maine Forest Service

Now I will talk about the Outcome-based Forestry Program developed by the Maine Forest Service in the response to state legislation. The legislation and program was developed to reduce the burden of regulations and support innovative and lower cost ways to achieve results. To be clear, I did not participate in developing the legislation or in the implementation of the program. However, in the early stages of program development, transparency was relatively low and information about the program was made publically available relatively late in the development of the program. Hence, my perspective is from afar outside looking in.

Brief legislative history...

- 1999 – MFS publishes first State of the Forest Report, advocates for the establishment of outcome based forest policy
- 2001 – 120th Legislature enacts PL 1999, c. 339, An Act to Promote Outcome-based Forest Policy
- 2007 – 123rd Legislature enacts PL 2007, c. 271, An Act To Extend the Time Allowed for Outcome-based Forestry (repealed 100,000 acre cap on individual agreements, 200,000 acre overall cap, and requirement to include ownerships less than 1,000 acres; extended sunset date an additional five years)
- 2012 – 125th Legislature enacts PL 2011, c. 488, An Act To Remove the Repeal Date for Outcome-based Forestry (repealed 5 year sunset date)

The program was recommended about 15 years ago to the legislature by the Maine Forest Service. Shortly afterward enabling legislation was based to support experiment outcome-based forestry, confining its application to areas 10,000s in acres in size. Subsequent amendments expanding the acreage and eliminated the “sun setting” of this legislation.

Characteristics

- A statute covers public and private forest landowners
- Voluntary
- Participation has been used wave requirements of the ME Forest Practices Act regarding clear-cut size and green-up standards
- Must show measurable progress towards achieving Maine's forest sustainability goals:
  - 1. Soil productivity
  - 2. Water quality
  - 3. Timber supply and quantity
  - 4. Aesthetic impacts
  - 5. Biological diversity
  - 6. Public accountability
  - 7. Economic considerations
  - 8. Social Considerations
  - 9. Forest health

Here is a list of key characteristics of the program based on information from the Maine Forest Service. Remarkably, it takes a broad, triple bottom line view of forest sustainability and sets broad goals for 9 key sustainability topics for participants.

Governance and Verification

- Governor appoints a panel of experts to work with Maine Forest Service and the forest landowner
- Panel, MFS and landowner establish landowner objectives
- Data and maps supplied to Panel and MFS (some proprietary)
- Open access of forest land to Panel. Panel has conducted field audits and relied on 3rd party forest certification audits (SFI and FSC) to assess compliance.
- Landowner supplies own annual report to MFS and Panel
- Landowner, Panel, and MFP report to Legislature

The governance and verification are key aspects of any outcome-based forestry program. The ME program is overseen by a panel of experts appointed by the governor. This panel works with the MFS and the forest landowners to establish landowner objectives. The landowner provide information which can include proprietary information and allows the panel to conduct site visits to verify outcomes. Forest certification by 3rd party auditors is also greatly used to help verify outcomes. The landowner submits annual reports to the panel and the MFS regarding the status of outcomes. All three parties report to the legislature.

Criterion 5 – Biological Diversity

Goal: Maintain biological diversity of healthy populations of native flora, fauna, ecosystems, and communities.

Outcomes

- Management address the habitat needs of the full range of species present.
- Maintain or mange for acreage in late successional (LS) condition through management and protection.
- Maintain a reasonable component of standing dead trees, live cull trees, and down logs across the landscape (not necessarily on every acre).
- High Conservation Value forests are properly identified and value protected on the ownership.
- Rare, threatened, and endangered species habitats are properly identified, and the land is managed to protect the habitats and occurrences of rare, threatened, and endangered species

Here is a list of outcomes that are relevant to old-growth forest. They don't actually mention anything about old-growth forest though they do reference late-successional forests.

Limitations of ME OBF

- Oversight panel does not include a conservation biologist
- Objectives are not specific, not measureable, and lack targets/goals
- Addresses LS but not specifically old-growth

From the information that is available, the Maine OBF Program has three limitations: (1) the panel of experts does not include a conservation biologist; (2) the objectives made public are not “SMART”, they are not specific, measureable, and lack quantitative targets; and (3) does not specifically address old-growth forests, a key age class for the conservation of biological diversity. The lack of SMART objectives diminish the credibility of this program.

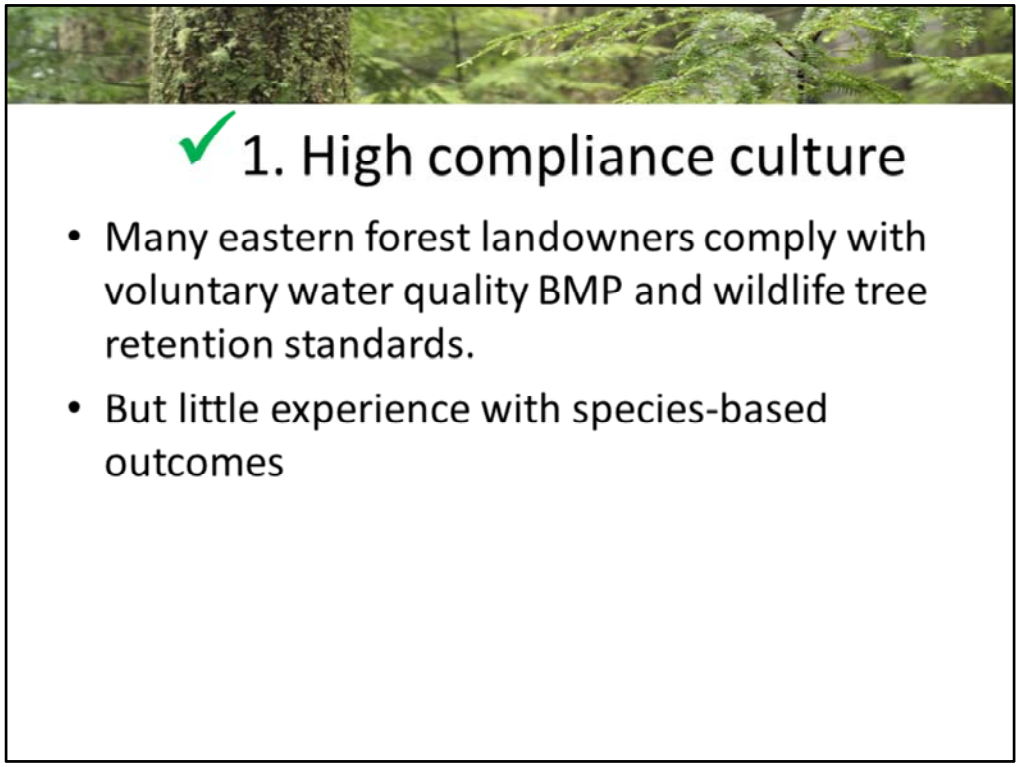
British Columbia

- Tried to go to outcome-based
- Evolved into a hybrid of outcome-based and practice-based because science was lacking and cheaper monitoring costs than “pure” outcome-based

It is interesting to note that the only other jurisdiction that has gone this route is British Columbia. BC created a tangled practices-based forestry system that became way to expensive and unwieldy to apply and so when on to try and develop an outcome-based forestry program. Along the way they realized that verification and monitoring of outcome-based systems can become too onerous for government and taxpayers. Hence, they own have a hybrid system compassed of outcome-based and practice-based programs.

Key considerations for old-growth

So how does this all apply to using outcome-based forestry to conserve old-growth forest in the Acadian forest region?



Well, the forest landowner sector has pretty high compliance with most non-voluntary forest regulations and even voluntary regulations such as water quality BMP programs. If mistakes are made, it may be that landowners avoid "breaking regulations as a risk control and social license management strategy. So I give the sector a large green check for high compliance.

✓ 2. 'SMART' and enforceable objectives

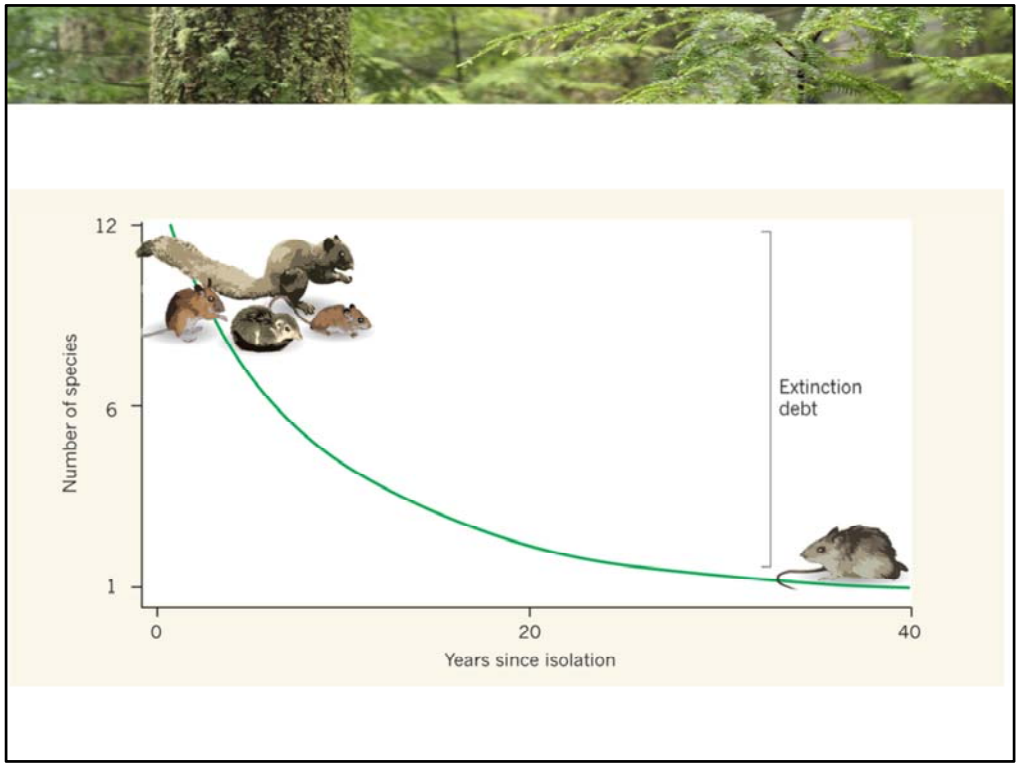
Attribute	Confidence
LS structure sub-stand and stand requirements	High
LS species stand requirements	Mod
LS species landscape requirements	Low?

I give a small green check for SMART and enforceable objectives. We know a lot about how to get some OG outcomes, especially structural outcomes and have less confidence for OG species outcomes. We know enough to know that some species have demanding requirements but we don't know whether science-based information is sufficient for achieving successful species outcomes and targets. Our biggest challenging is having high confidence on manage species at the landscape level. If we maintain a certain configuration of LS and OG habitats, will species definitely be present? Can we reliably manage habitats and landscape configuration for different species.

3. Timelines are appropriate

- Uncertainty due to extinction debt
- …"the future extinction of species due to events in the past. Extinction debt occurs because of time delays between impacts on a species, such as destruction of habitat, and the species' ultimate disappearance."

I have no check mark for appropriate timelines. Many OG and LS species may be at risk to extinction debt where individuals may be present but the habitat conditions necessary for population viability no longer exists. These species are also referred to the living dead in some contexts because the individuals are present but they contribute little to ecological function, that they are functional dead and will likely be extirpated.



Extinction debts can occur through habitat fragmentation or other forms of habitat degradation. If you pretend that these small mammals are OG insects. A residual patch may contain several species at the time of harvest of the surrounding forest but over time most of the species die off from the patch until there is only one species hanging on.

4. Risks to key values

Risks to LS and OG are high.

- Economic pressures to LS/OG are high.
- Hard to quickly restore LS/OG when mistakes are made

The final factor of success to consider for outcome-based forestry is the risk to key values. I don't include any check because the risk to LS and OG are inherently high in managed forest landscape. There is large economic pressure not to maintain LS and OG and once they are lost is takes centuries to restore LS and OG conditions.

Overall, It is very difficult to use outcome-based forestry to conserve old-growth forest in managed landscapes because it is hard to get the timelines right and because the risk to OG values is high. This is not to say that outcome-based forestry can't work for other key forest values, such as water quality.

Summary

- Definition: …achieving forest sustainability goal(s) through an **adaptive process** of performance **measurement** (the "outcome"), **verification**, and **improvement**.
- ME example – strong but lacks conservation biologist and specific outcomes
- Lack of scientific knowledge and risk factors may make it difficult to apply outcome-based forestry to LS/OG.

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In summary
Outcome-based forestry focuses on using an adaptive process of measurement, verification, and improvement to ensure outcomes are achieved.
Maine has a strong example but may be missing two key components: inclusion of an expert conservation biologist and lack of measureable specific outcomes
Lack of scientific knowledge and risk factors may make it difficult to apply outcome-based forestry to LS/OG.