



2022

IMPACT. SCIENCE. SOLUTIONS.

For nearly 80 years, the National Council for Air and Stream Improvement, Inc. (NCASI) has been a constant source of unbiased research and support for the forest products industry. We are proud to continue this legacy, while growing and adapting to the demands of the industry and the world around us.

In the subsequent pages you will see highlights of the good work we have done over this past year with you and on your behalf. As we look to the future, we are embracing the journey and renewing our pledge to be not only responsive to current needs but serve as visionaries ahead of emerging issues that will impact your businesses and our work.

As examples, two areas in which we are expanding our efforts are in the topical area of Carbon and increased support of the Wood Products segment. We have included highlights of a few of the tools, resources, and trainings we have produced in the past year with much more to come.

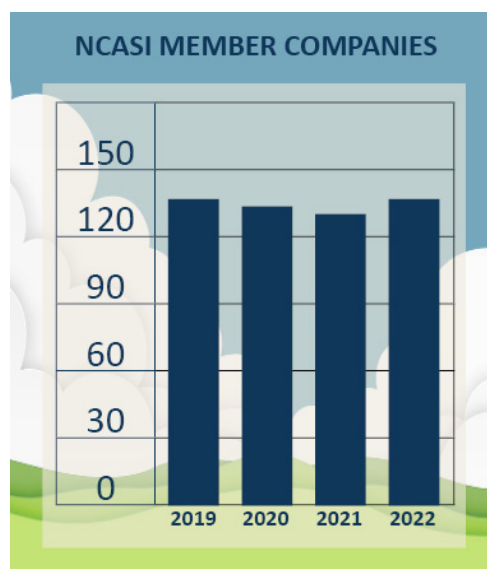
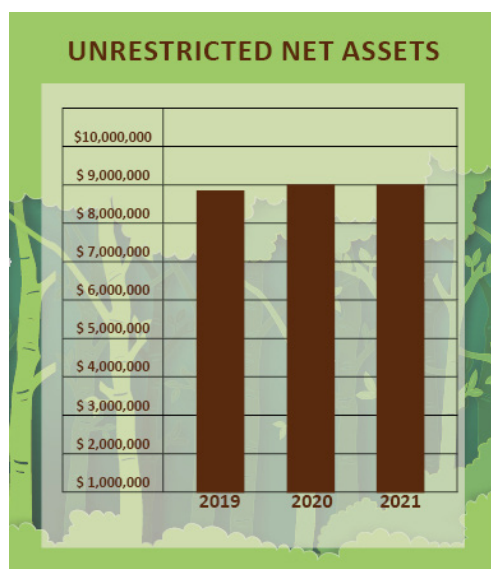
The past couple of years have created many challenges and opportunities for our industry. Through it all, I am proud to say that as a testament to our Members' belief in our value and commitment to our work that we have maintained both our Membership numbers and stable financial results. By doing so and with your continued support, NCASI remains the resource that provides the forest products industry with the knowledge and tools required to cost-effectively meet environmental and sustainability goals through basic and applied research, technical support, and education.

Please accept my deepest appreciation of your support and loyalty. Without our Members, we would not be able to continue this critical work. We look forward to our continued growth and partnership. Together, we are creating positive impacts.

Please visit our website (ncasi.org) or feel free to send me an email at dkrouskop@ncasi.org if you would like more information or have any questions.

Sincerely,

Dirk J. Krouskop, President



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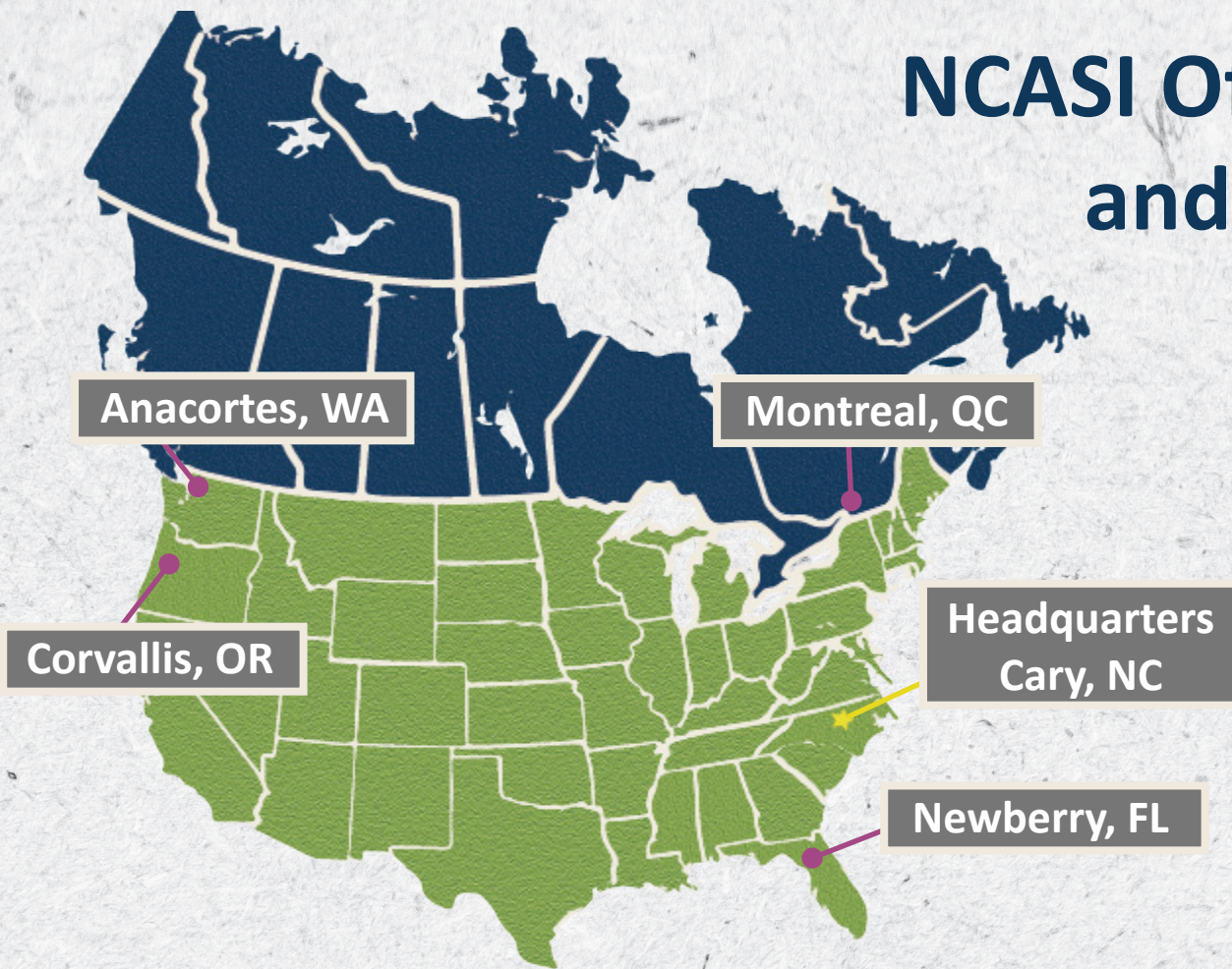


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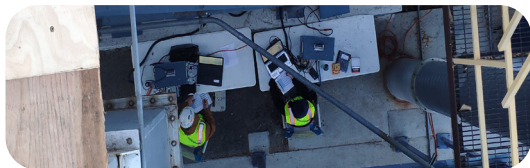
NCASI Offices and Labs



We support the entire forest products industry in the following areas

Air <p>Focuses on improving the science and implementation of emissions measurement methods and industry understanding of emissions and ambient impacts.</p>	Biodiversity <p>Contributes to the scientific body of knowledge on the sustainability of forest practices on managed forests related to the relationship between forest management and biodiversity.</p>	Chemical Management <p>Designed to help members meet the challenges associated with ensuring the safe and effective use of chemicals and related regulatory reporting obligations.</p>	Climate <p>Quantifies and enables recognition of the greenhouse gas (GHG) and biomass-carbon related characteristics of forest-based products and activities.</p>
Forestry <p>Addresses important technical questions related to sustainable forestry, third-party certification, forest environmental management, and government regulation of forestry operations.</p>	Sustainability <p>Focuses on characterizing the potential impacts of a variety of activities along the value chain and identifying cost-effective ways to reduce these impacts.</p>	Water <p>Contributes to the scientific understanding and conservation of water resources in the areas of water quality, aquatic biology, and forest watersheds.</p>	Wood Products <p>Seeks to fill the critical data needs of this industry sector and develop technical information that enables optimal operations and emissions management.</p>

BASIC & APPLIED RESEARCH



Advanced the science behind **PM2.5 measurements**, a critical regulatory driver. Extensive experimental work with condensable PM (CPM) measurement methods is being leveraged to inform ongoing EPA studies and develop an interim approach for a bias correction for EPA Method 202 data. Approaches are being developed to leverage particle size analysis (PSA) as a tool for estimating PM2.5 emissions, from sources that either don't have or are challenging to test using reference methods.

Summarized data from **PM2.5 testing** on two scrap and trim cyclones at converting facilities, and associated challenges and learnings in a white paper to be published in late 2022. This activity bridges a critical data gap related to a permitting need.

Completed and published a series of technical bulletins that analyze extensive data from **Boiler MACT performance tests** available on EPA's WebFIRE database. This series includes data for mercury, hydrochloric acid, carbon monoxide and particulate matter.



Completed an experiment evaluating **polar organic chemical integrative samplers (POCIS)** under pulsed and continuous toxicant exposure scenarios. Data from these experiments will be used to better interpret instream effects of potential contaminants.

Completed an evaluation of Whole Effluent Toxicity (**WET**) **test modifications** to account for episodic flows, such as those associated with stormwater and precipitation-related treatment system overflow, to more appropriately link toxicity assessments with true environmental exposures.



Published ***Contextualizing Life Cycle Assessment with Human and Ecological Health Effects for Paper and Plastic Products***. This white paper summarizes published literature and shows that including human and ecological health risk assessment outcomes may alter the conclusions drawn by traditional life cycle assessment (LCA); as a result, these outcomes should be considered in addition to LCA when assessing the potential environmental impact of a product.



Mobilized to provide insights into the **historic 2020 fires in the Pacific Northwest** and their environmental consequences. Addressing the fires was made a high priority for research and technical support, including extensive collection of field data, initiation of several new studies, and draft peer-reviewed publications already in process.

Completed the Regional BMP Effectiveness Study, a collaborative effort with Virginia Tech and the Sustainable Forestry Initiative (SFI). Seven peer-reviewed manuscripts have been accepted for publication from this work, which documents value of **forestry best management practices to protect water quality and aquatic systems**.

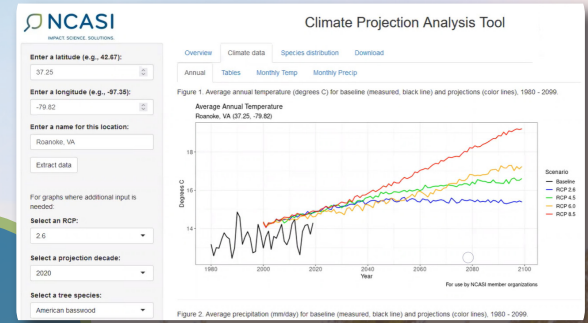
Published an article in the prestigious *Journal of Applied Ecology*. The article, authored by cooperators at Oregon State University, represented the culmination of a long-term study to understand **effects of intensive forest management during stand establishment on biodiversity** in the Pacific Northwest, including effects of herbicide treatments. The study began in 2009, with data collected through 2016, representing a significant commitment from NCASI staff and our Member Companies.

Hot Topic - CARBON

Tools

Climate Projection Analysis Tool - CPAT

NCASI designed this interactive tool to help our Member Companies understand future climate conditions at discrete locations across the US, and to help them meet climate-smart forestry objectives.



Scope 3 Greenhouse Gas Screening Tool

NCASI developed a forest products sector-specific calculation tool for estimating Scope 3 emissions – vital for Members Company reports on GHG standards and for Environmental, Social, Governance (ESG) reports.

SBTi FLAG Guidance Development and Net Zero Target Setting

NCASI provided assistance to Member Companies using NCASI GHG tools to set an emission baseline, and answered follow-up questions posed by SBTi related to target setting.

Scenario-Based Climate Change Risk Assessment under TCFD and CDP

This white paper is of significant utility to Member Companies reporting in the context of ESG to financial investors.

Regulatory Guidance

Support during Development of GHG Policy in Pacific Northwest

NCASI provided extensive assistance to Member Companies throughout the highly-active development of state-wide GHG reduction programs by states in the Pacific Northwest.

Land Sector and Carbon Removals Guidance to the GHG Protocol

NCASI contributed significant technical and scientific expertise to the development of this guidance, which will have a pivotal impact on how biomass carbon emissions and storage are reported, including their potential for being considered “carbon neutral.”

Greenhouse Gas Reductions for the US Pulp and Paper Industry

This white paper assists the industry in framing its significant GHG reductions during policy-related discussions with government and communications with stakeholders.

OPERATIONAL SUPPORT



NCASI staff provided extensive technical support to Member Companies on the following topics:

- Approaches to estimate H₂S and organic reduced sulfur compound emissions to assess impact of process changes on emissions and ambient impacts. This support was used for permitting new projects or as part of permit renewals.
- Studies to assess the impact of process and paper/paperboard grade changes on condensate collection, condensate characterization and MACT compliance.
- Approaches to leverage MACT data from pulping and papermaking sources to generate estimates of speciated VOC emissions
- Emission test planning and review of HAP, VOC, total PM, PM₁₀ and PM_{2.5} emission test data
- Review and drilldown of data in the air emissions database(s) to identify emission factors for specific use-cases and operating scenarios.
- Questions on TRI reporting requirements, suitability of data, and estimation approaches.



Coordinating with Member Companies, NCASI collected detailed data on condensate characterizations and on the fate of methanol and terpenes in pulping. This data analysis will advance industry understanding of the impact of pulping process and/or product/ grade changes on condensate collection, MACT compliance and will be essential for permitting.



Chemicals in Products Sheets (ChIPS), which reviews chemicals that can potentially be found in paper and forest products, were updated for PFAS, titanium dioxide, and bisphenol- A and its substitutes. Biannual literature reviews that investigate new literature related to chemistries in food contact packaging were completed.

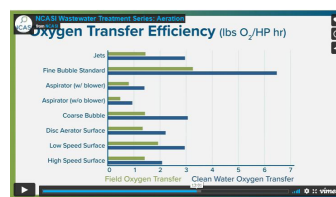


NCASI staff responded to more than 80 individual member requests for wastewater treatment operations support. Common topics of inquiry included optimal nutrient management, managing treatment system startups and mill outages, and planning for dredging or aeration upgrades.

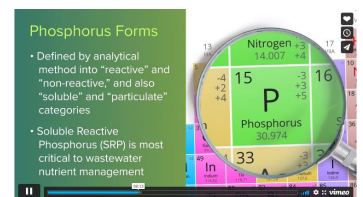
In response to Member Company requests for additional wastewater operations educational material, NCASI developed a video series covering topics of industry interest. In 2021, videos were produced on the topics of wastewater fundamentals, wastewater aeration, and nutrient management. In response to positive Member feedback, additional videos are currently in development and will be released in 2022.



Overview



Aeration



Nutrient Management



Company-specific confidential pulp and paper benchmarking reports were developed and distributed to North American pulp and paper companies in 2021.

Report on Potential Impacts of Microplastics on Land-Applied Wastewater Residuals. This report helps inform facilities when making decisions regarding proper management of residual containing microplastics and to address future questions and concerns from landowners in land application programs.

NCASI coordinated Member Company responses on proposed changes to the EU Ecolabel related to fluff pulp criteria, and developed material to support their ability to use this label.

Developing Segment - WOOD PRODUCTS

NCASI's pillars of value for the wood products sector

- Air emissions
- Carbon, greenhouse gases (GHGs), energy benchmarking, and ESG topics
- Forest management and fiber supply
- Beneficial use of manufacturing residuals
- Stormwater, condensate, and wastewater issues

Highlights



Wood Products Air Emissions Database

To incorporate new data from the recent EPA information collection request (ICR), NCASI completed a significant update to this database. As part of this update, NCASI undertook a rigorous quality assurance of the new ICR data, modified source nomenclature and terminologies to reflect industry practices, and incorporated a significant amount of new PM2.5 emissions data. The updated database will be released in 2022.



North American Wood Products Facilities Benchmarking Report

One of NCASI's important contributions to our Member Companies is the collection, analysis, and documentation of the North American wood products sector's environmental and energy performance in context of mill-specific operations.



Boot Camp on Canadian Environmental Regulations of Relevance to Wood Products Facilities

This four-part webinar series was highly attended by Member Companies. Participants found the sessions very helpful, particularly new employees with a need to better understand the Canadian wood products regulatory landscape.



GHG Calculation Tools for Wood Products Facilities

With support expertise from AF&PA and FPAC, and NCASI Member Companies, NCASI completed development of a calculation tool for GHG emissions from wood product manufacturing facilities in 2004. The International Version of the tools were updated in early 2022 to reflect updated Global Warming Potentials.

REGULATORY GUIDANCE



Worked with EPA and external contractors to accelerate the review and reinstatement of Other Test Method (OTM) 036 for **measuring filterable PM2.5** from sources with entrained water droplets. This method will be reinstated shortly; NCASI's work on this critical project has expedited the reinstatement of this method and its availability for facilities as a performance- based method.



Completed an evaluation of similarities and differences between EPA programs on the **rigor of selecting and applying epidemiology for rulemakings** progressing toward the goal of a peer-reviewed publication. This evaluation relies on a matrix of criteria originally designed to communicate the needs of risk assessors to epidemiologists, in order to assist epidemiologists with the incorporation of study elements that facilitate reducing the uncertainty in policy-relevant risk assessments.



The **potential contributions of the forest sector to Other Effective Area-Based Conservation Measures (OECM) implementation**, particularly in the context of a potential reduction in forest management areas to meet Canadian national protected land targets. This study was published as Technical Bulletin No. 1075.



Completed an evaluation of the **relative effects of effluent exposure on new Whole Effluent Toxicity (WET) test assessment methods under development by EPA**. For pulp and paper mill effluents, the new species appear to be less sensitive than currently approved species. Results were presented at the 42nd Annual Meeting of the Society of Environmental Toxicology and Chemistry, and published in NCASI Technical Bulletin No. 1077.



Developed a concise, **visual resource to illustrate the significant complexity and comprehensiveness of forest management regulation in Canada**. The fact sheet summarizes federal and provincial regulations and standards by purpose and geographic location, along with sustainable forest management third-party certification and company-specific forest management planning (annual, 5-year, 25-year, and 100-year).



Sustainable Forest Management

39
Peer reviewed manuscripts

NCASI staff and collaborators published 39 peer-reviewed manuscripts, contributing to the science of sustainable forest management. This research helps ensure science-based policy decisions that impact fiber supply and our Member Companies' license to operate, including meeting forest certification requirements.



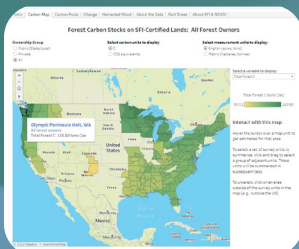
Endangered Species Act

24
actions

Forestry Staff provided technical comments on 24 proposed actions by the U.S. Fish and Wildlife Service (USFWS) relative to Endangered Species Act proposed rules.

These comments provide the USFWS with the best available scientific information relative to species conservation and private forest management. The USFWS is clearly incorporating NCASI comments into its proposed and final rules, strengthening science-based policy decisions.

Power in Partnerships



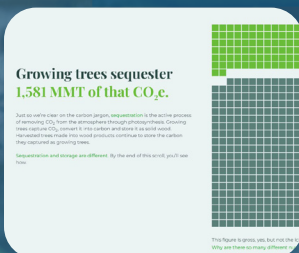
SFI Carbon and Water Tools

NCASI worked with The Sustainable Forestry Initiative (SFI) to create interactive, science-based tools to increase understanding of how SFI-certified forests can be used as nature-based solutions to help mitigate climate change and ensure conservation.



AF&PA Better Practices Better Planet 2020 Sustainability Goals, and Assistance with Development of 2030 Sustainability Goals

NCASI analyzed mill-specific performance data and calculated the progress toward AF&PA's sustainability goals for process effluent reduction, GHG emission reduction, and energy efficiency.



NAFO Forest Carbon Visualization Tool

NCASI scientists provided the data and science support for the NAFO Forest Carbon Visualization Tool, which garnered recognition from the prestigious Anthem Awards in the category of Climate/Environment/Sustainability.



Wildlife Conservation Initiative (WCI)

NCASI serves as the science lead in active research projects in six US Fish and Wildlife Service (USFWS) regions. The WCI is a collaborative effort among NAFO, and NAFO Member Companies, USFWS, SFI, and other partners, to conserve at-risk and declining species in private forests.



NCSU Collaboration on Bioaugmentation in Wastewater Treatment

In conjunction with North Carolina State University, NCASI completed a full-scale, paired system control study exploring the effectiveness of bioaugmentation to improve BOD and TSS removal performance at a mill wastewater treatment system and found little or no value in the use of bioaugmentation.

NCASI Foundation

In conjunction with partners and NCASI staff, the NCASI Foundation fosters and supports scientific research to enable the development of credible, practical solutions to environmental and forestry-based challenges, contributing to a healthier planet for generations to come.





NCASI

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