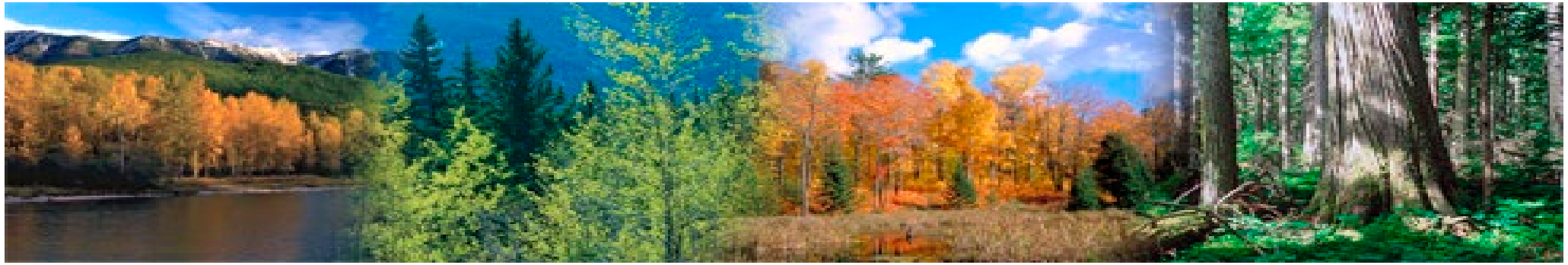

The Impacts of Wildfire Emissions on Net-Zero Targets

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Greenhouse Gas Emissions from Wildland Fires:
Toward Improved Monitoring, Modeling, and Management

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*with thanks to Giacomo Grassi for comments

Canada

To limit global warming at ANY temperature we must reach net zero emissions globally

- To keep global average temperature increases below 1.5^{o} C **we need to achieve net zero anthropogenic emissions in the early 2050s and net negative emissions** in the second half of this century.
- Anthropogenic CO_2 removals from the atmosphere must be greater than anthropogenic emissions.
- Expectations are that the land sector, forests and wood product C storage will significantly contribute to these removals.
- But forests are at increasing risk from climate change impacts.

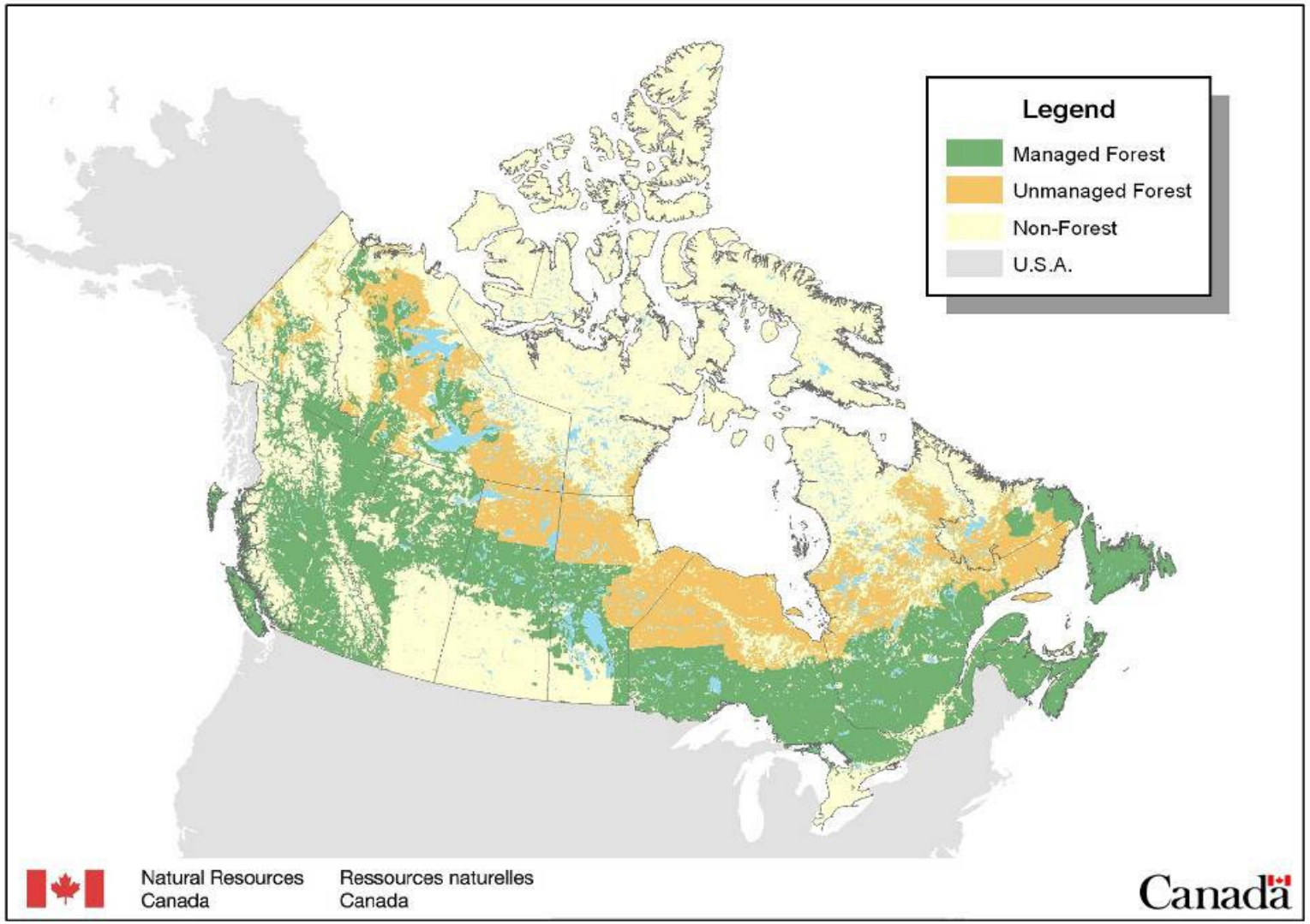
Land C fluxes: Global vs. National Perspectives

- For IPCC assessments of future temperature increases, the full global carbon balance (as observed in the atmosphere) is quantified.
- National emission reduction targets are based on estimates reported in the National GHG inventories (NIRs).
- But NIRs focus on anthropogenic emissions and removals and therefore do not include all emissions that affect the atmosphere.
- Objective of the Global Stocktake under the Paris Agreement is to assess whether the emission reductions of the National climate plans are sufficient to limit future temperature increases to well-below 2 degrees C.

Managed and Unmanaged Forest in Canada

Managed Forest: 226 Mha – report annual emissions and removals since 1990

Unmanaged Forest: ~121 Mha – monitor and report land-use change only



Estimation, Reporting and Accounting of Forest Sector Fluxes in Canada

Managed Forest

Anthropogenic Component:

- Estimated
- Reported
- Accounted

Managed Forest

Natural Disturbance Component:

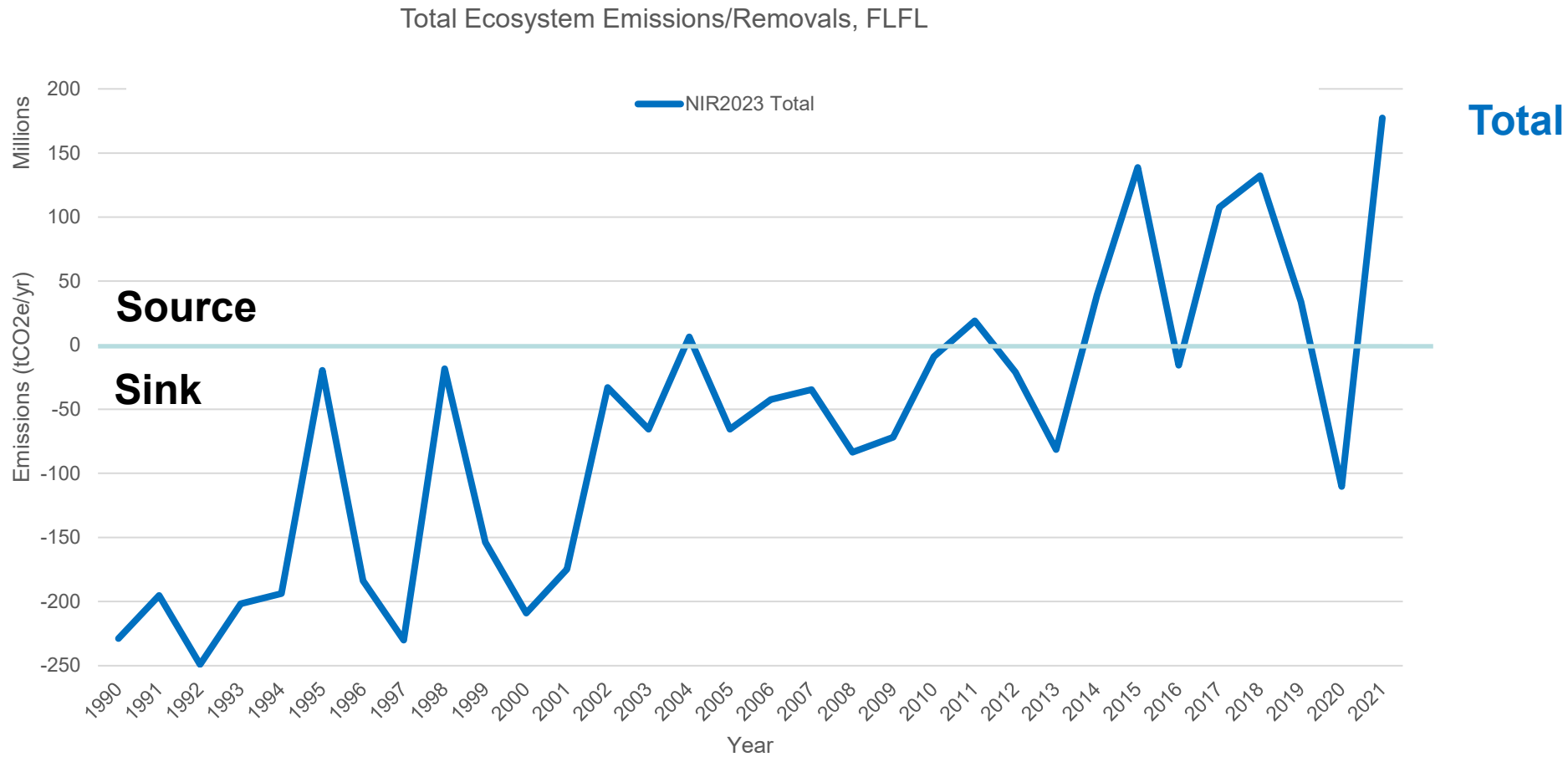
- Estimated
- Reported
- **Not Accounted**

Unmanaged Forest

- Not Estimated
- Not Reported
- Not Accounted

Forest Ecosystem Emissions and Removals – NIR2023

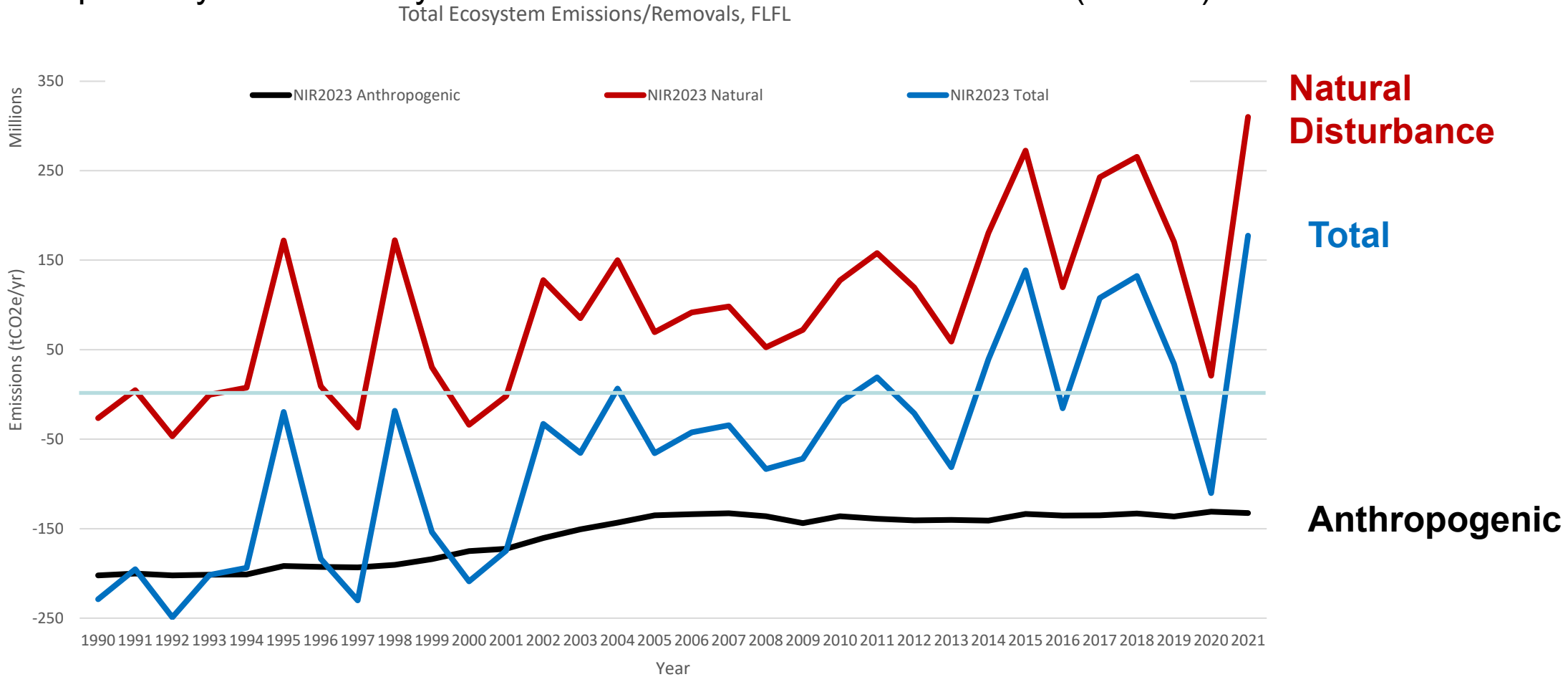
Includes impacts from human activities + severe natural disturbances like wildfire for Canada's **Managed** Forest (226 Mha), (emissions from harvested wood products not included in graph).



Source: Canada's NIR 2023 and CFS data

Disaggregation of Emissions and Removals – NIR2023

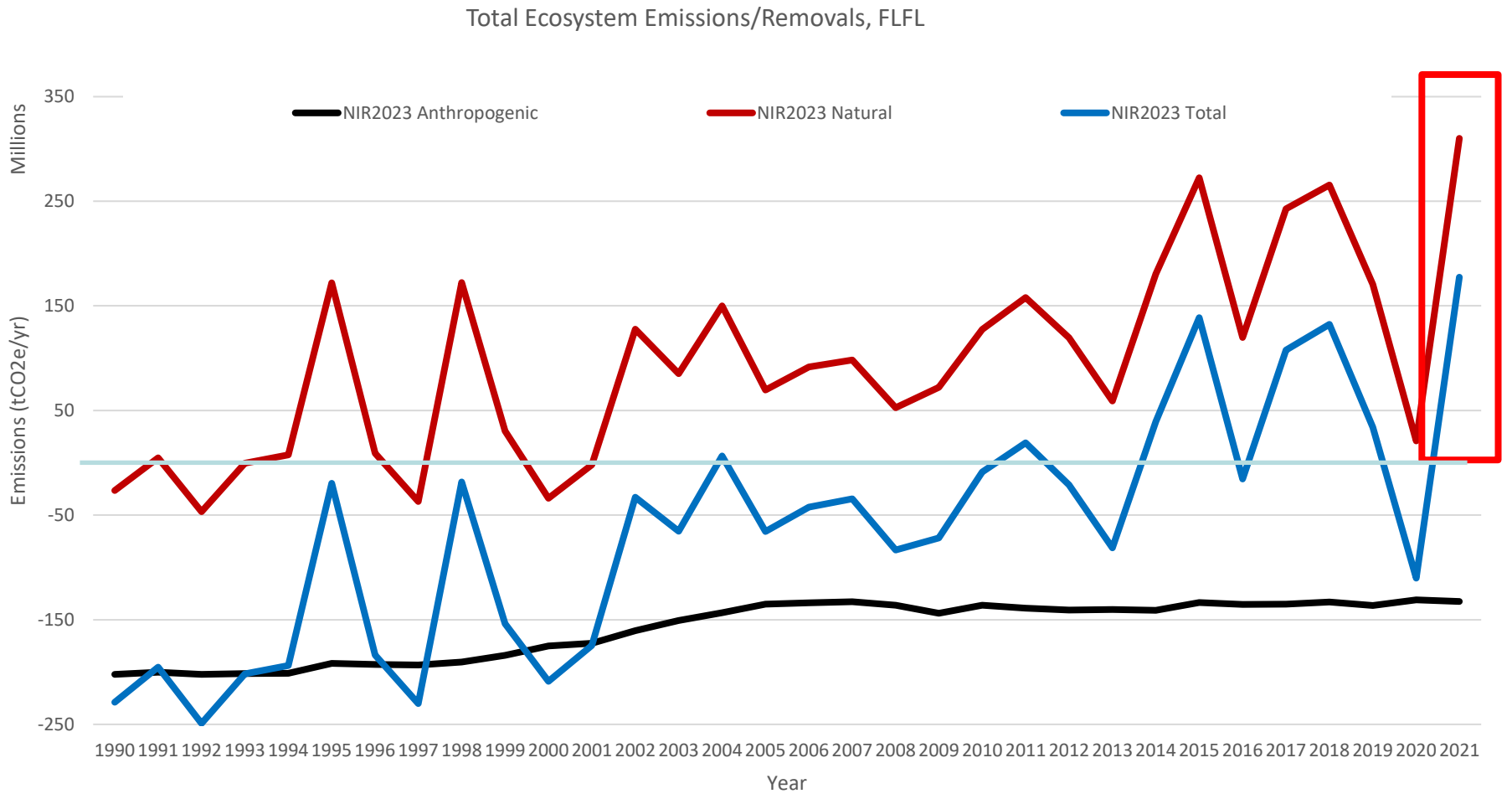
Disaggregated* into E/R component primarily influenced by human activities (Anthropogenic) and component primarily influenced by severe natural disturbances like wildfire (Natural)



* Kurz et al. 2018: https://doi.org/10.1139/cjfr-2018-0176 and IPCC 2019 Refinement

Could mitigation outcomes be overwhelmed by disturbances?

Will depend on the magnitude of changes in emissions/removals due to mitigation and disturbances



~290 Mt CO_2e direct fire emissions

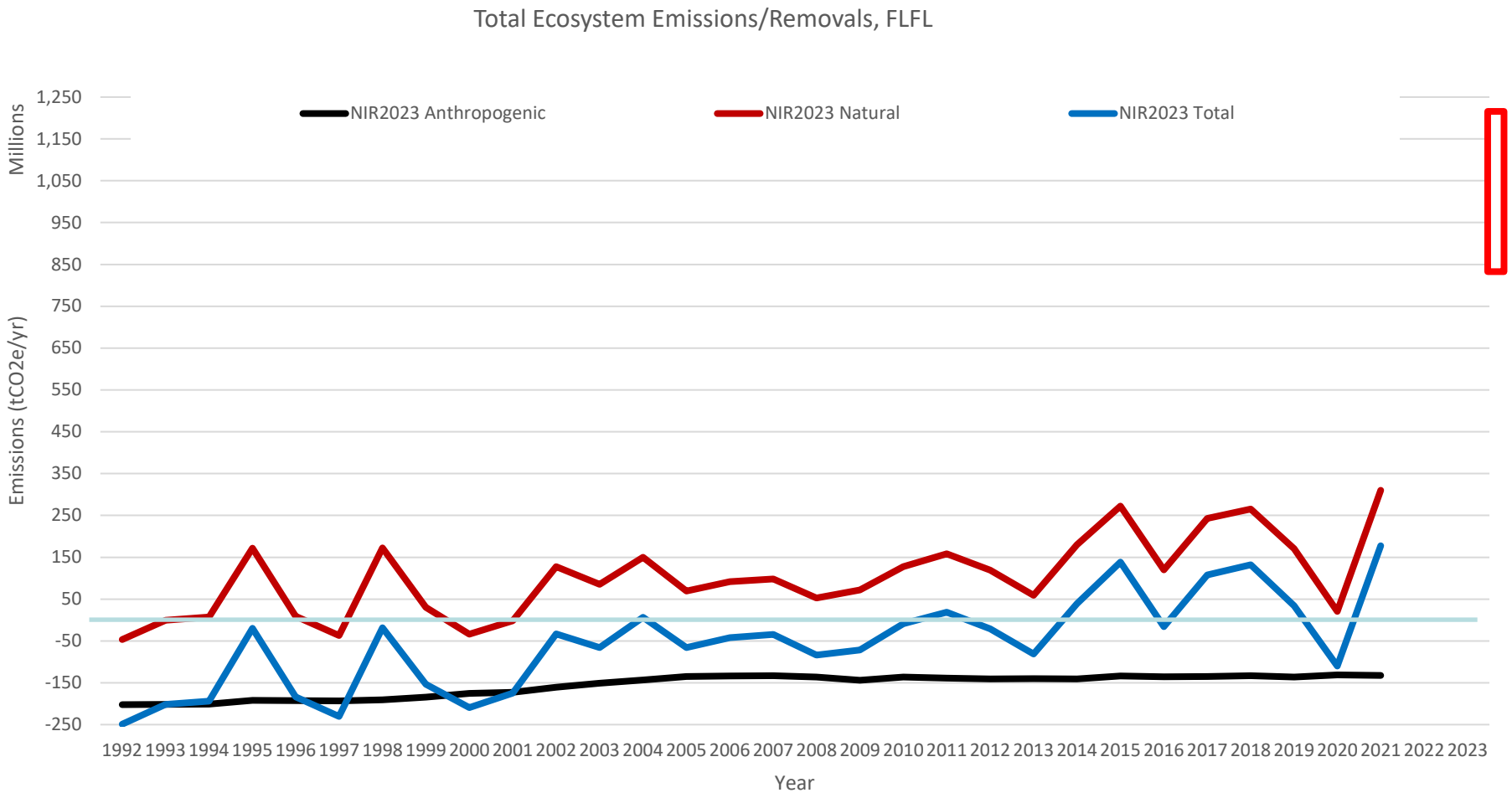
Change in disturbances?

Mitigation Outcomes?

* Kurz et al. 2018: https://doi.org/10.1139/cjfr-2018-0176 and IPCC 2019 Refinement

2023 Wildfire Emissions in Managed Forest

2023 wildfire emissions (to Sept 11) in managed forest alone are 1.4 times the emissions from all other sectors in Canada.



~930 ± 150 Mt CO2e direct fire emissions

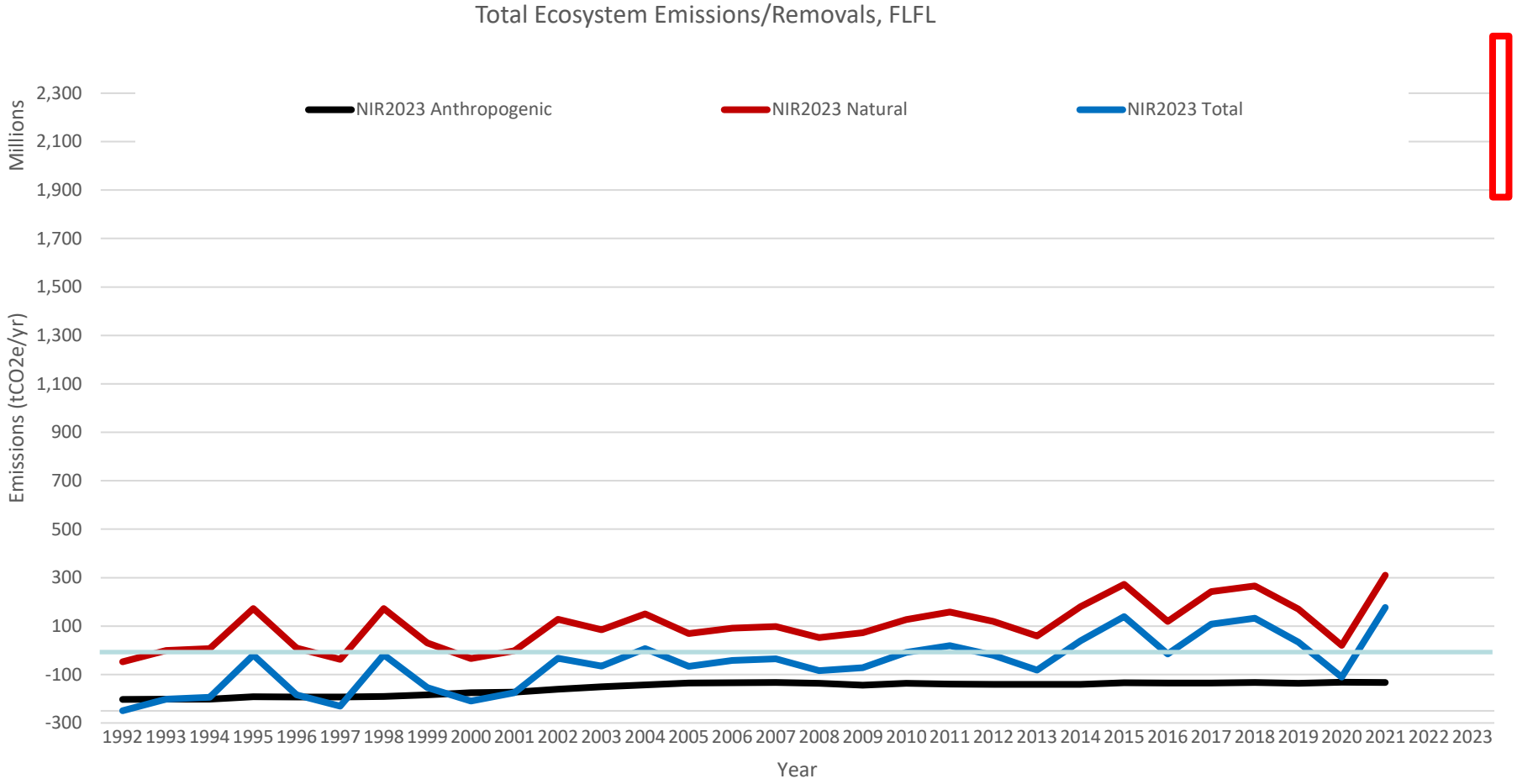
This is 3.2 times the fire emissions in 2021, the previous extreme year.

Hundreds of fires still burning.

* Kurz et al. 2018: https://doi.org/10.1139/cjfr-2018-0176 and IPCC 2019 Refinement

2023 Wildfire Emissions in all Forests

2023 wildfire emissions (to Sept 11) from all wildfires are about 2200 Mt CO_2e, 3.3 times the emissions from all other sectors in Canada.



~2200 ± 250 Mt CO2e direct fire emissions

* Kurz et al. 2018: https://doi.org/10.1139/cjfr-2018-0176 and IPCC 2019 Refinement

Mitigation vs. disturbance impacts

Analyses to date consistently show that disturbance impacts can exceed mitigation benefits by one or two orders of magnitude

Mitigation Actions

affect a small proportion of the forest in some years.

Climate Change

affects all of the forest every year.

Direct and indirect wildfire emissions

Wildfire emissions include direct emissions (reported in previous slides) PLUS the indirect emissions resulting from the decay of fire-killed trees over subsequent years.

Carbon contained in fire killed trees is of same magnitude as the carbon contained in the direct emissions.

Improved estimates of wildfire emissions

To reduce uncertainties in wildfire emission estimates, Canada is developing a new National Forest Carbon Monitoring, Accounting and Reporting System that will

- include managed and unmanaged forests,
- be spatially-explicit at 1 ha resolution, and
- improve representation of fire severity and associated fuel consumption.

Who is responsible for emissions from climate change impacts?

The focus of National GHG reporting is on anthropogenic emissions and removals, but there is a need to also quantify the emissions from natural disturbances, including those on unmanaged lands.

But who will ultimately be responsible for emissions due to climate change impacts (i.e., indirect human-induced emissions such as those from wildfires and permafrost thawing)?

These are not included in National GHG reports but do reduce the “remaining C budget” – which means global ambitions to reduce emission have to increase.

Forests and Net Zero Targets

If we want global forests to contribute to net zero targets, then we have to **shift focus from timber management to carbon management** with the goal to increase carbon sinks and forest resilience to future climate change impacts.

Thank you

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