SOLUTION

REQUIRE NZEPA TO USE BEST AVAILABLE EVIDENCE

MAKE
NEW ZEALAND
HEALTHY

THE PROBLEM: The new Environmental Protection Authority (NZ EPA) CEO has inherited a hazardous-substances system better equipped to process applications than to undertake long-term scientific stewardship: increasingly 'fit for business', but not fit for stewardship.

The NZ EPA exists to protect farmers, growers, the public and the environment. The Hazardous Substances and New Organisms Act 1996 (HSNO) is protective and preventative and explicitly requires precaution under scientific and technical uncertainty. Yet the evidence points to a mesh of scientifically important blind spots: weak monitoring-to-regulation feedback loops; inadequate pesticide-use and exposure data; limited treatment of mixtures and cumulative loading; underdeveloped approaches to endocrine disruption; insufficient systematic review of emerging science; and no clearly operationalised pathway showing how material uncertainty should escalate scrutiny or precautionary action. These foundations currently appear incomplete.

This weakness is particularly evident where the NZ EPA relies on overseas regulators. Overseas risk assessments are valuable, but their conclusions apply to the representative uses actually assessed, including formulation, application rate and frequency, crop or setting, exposure pathways and regulatory controls. Where New Zealand permits materially different uses, the NZ EPA cannot scientifically import the reassuring conclusion without establishing whether the underlying risk assessment remains applicable.

The NZ EPA lacks sufficient stewardship intelligence to continuously test whether existing approvals, overseas assessments and regulatory controls remain protective under real-world New Zealand exposures.

THE SOLUTION: Build a public-good, transparent and integrated system for scientific stewardship, monitoring and regulatory judgement that protects human and environmental health in practice.

A reform agenda for the NZ EPA and its new CEO should give staff sound, current scientific information, clear decision pathways, multidisciplinary expertise and the institutional capability to interrogate evidence and act under uncertainty.

This requires a permanently funded stewardship intelligence function for horizon scanning, systematic evidence review, pesticide-use and exposure intelligence, and uncertainty characterisation; routine assessment of mixtures and cumulative loading; and formal feedback loops connecting environmental monitoring with reassessment and regulatory controls.

Anchor reassessment to New Zealand exposure reality. Reinstate Environmental Exposure Limits linked to assessed representative uses, and monitor whether real-world exposures remain within those limits. Overseas regulatory conclusions should inform NZ EPA decisions, not substitute for them. Where New Zealand application rates, frequency, formulations, environments or controls fall outside the overseas assessed envelope, the EPA should explain whether and why those conclusions remain applicable, impose equivalent protective controls, or undertake the additional scientific assessment required.

The objective is not simply more regulation. It is better regulatory science: giving EPA scientists the information, expertise, tools and mandate to ask the right questions, identify what is not known, give practical effect to precaution, and ensure regulatory decisions remain protective as science and New Zealand exposures change.

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THE SOLUTION: Build a public-good, transparent and integrated system for monitoring, analysing and making regulatory judgements that protects human and environmental health in practice, not merely in principle.

A reform agenda for the NZ EPA and its new CEO should give staff the scientific capability, institutional support and clear decision pathways required to make decisions that are genuinely protective and preventative.

The protective architecture of the Hazardous Substances and New Organisms Act 1996 is not self-executing. Its purpose and precautionary provisions depend upon officials having the information, expertise and procedures needed to identify hazards, characterise exposure, evaluate uncertainty and respond when evidence changes. At present, important parts of that scientific infrastructure are missing or underdeveloped.

Its precautionary obligation cannot operate by aspiration alone. Institutional capacity and dedicated, long-term resourcing is required to achieve this purpose over time.

The NZ EPA has stepped away from formal risk assessment and is turning to the decisions of foreign jurisdictions. However, if this is to occur, the NZ EPA must recognise that the decisions made as a consequence of the risk assessment, any changes in controls, is as relevant as the scientific information that is considered in a risk assessment.

The NZ EPA cannot import the jurisdiction’s conclusion on safety, while failing to identify, communicate and where necessary adopt the restrictions and exposure boundaries that made that conclusion scientifically defensible. A competent regulatory system should make this relationship explicit.

Whenever the NZ EPA relies on an overseas assessment, staff should identify what was actually assessed, compare those conditions with New Zealand use, and determine whether New Zealand remains inside or outside that evidential envelope. Where New Zealand permits higher rates, more frequent applications, different formulations, different receiving environments or entirely additional uses, the Authority should either adopt equivalent protective controls or undertake the additional assessment required.

Such transparency provides an evidentiary pathway not only for EPA staff, but also for independent scientists, territorial authorities and the public. It allows others to see what evidence was considered, what assumptions were made, where uncertainty remains, why a conclusion was reached and what evidence would trigger reconsideration. Confidence in the regulator should arise from the visible quality of its scientific processes rather than from institutional assertion.

The HSNO Act's purpose is to safeguard people and the environment. Its precautionary obligation cannot operate by aspiration alone. It requires institutional capacity and sustained public funding, including:

- Skilled multidisciplinary personnel spanning toxicology, epidemiology, exposure science, environmental chemistry, ecology, statistics and regulatory law, supported by modern

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analytical tools including AI-assisted evidence synthesis, data mining and monitoring analytics.

- Reliable human and environmental exposure information that is collected, integrated and updated over time.
- Transparent decision pathways explaining how uncertainty, precaution, representative uses, exposure assumptions and overseas regulatory evidence are evaluated.
- Systematic evidence synthesis and research capability able to investigate emerging mechanistic pathways, cohort evidence, developmental windows of vulnerability, low-dose effects and endocrine-system effects.
- Monitoring-to-regulation feedback loops that ensure new evidence flows back into approvals, reassessments and controls, and that regulatory findings are communicated back to industries, regions and communities.

The NZ EPA does not presently appear to possess all of these capabilities at the depth required. Precaution consequently risks becoming reduced to conservative assumptions inside modelling exercises rather than functioning as the dynamic, inquiry-driven form of environmental stewardship contemplated by Parliament.

MNZH therefore proposes a reform agenda for the NZ EPA and its new CEO to support staff to make decisions that are protective, preventative and scientifically accountable.

1. **Build a permanently funded stewardship intelligence function.** Establish an internal unit responsible for continuous horizon scanning, systematic evidence review, uncertainty characterisation and transparent evidence registers. This function should operate independently of individual applications and proactively identify emerging hazards, international regulatory developments and New Zealand exposure concerns.

   Establish through this unit, a national pesticide-use intelligence stream capable of aggregating, analysing and publishing information on quantities, frequency, geography and patterns of use.

2. **Re-orient reassessment towards New Zealand exposure reality.** Ensure that overseas regulatory conclusions and industry submissions are inputs to reassessment, not substitutes for it. Require every reassessment to explicitly compare overseas representative uses, application rates, frequency, formulations and controls with those authorised in New Zealand, alongside local receiving environments and monitoring data.

   Where New Zealand use lies outside the assessed overseas envelope, require the NZ EPA to transparently identify the difference, explain whether and why the overseas risk conclusions remain applicable, and either impose equivalent controls or undertake the additional scientific assessment required. Glyphosate provides an obvious test case for implementing this reform.

3. **Appoint a Senior Integrated Pest Management and Resistance Ecology Adviser at principal scientist level.** This adviser should bring expertise in IPM, weed and insect

ecology and resistance evolution, working alongside toxicologists and exposure scientists so that chemical approvals and reassessments are evaluated against viable non-chemical and diversified management strategies.

This expert perspective would strengthen benefit-risk analysis and provide information to support the reduction in systemic dependence on chemical solutions where resistance is increasing, or more information is highlighting the toxicity of a product.

4. **Hard-wire mixtures and cumulative exposure into routine practice.** Move beyond single-substance assessment as the regulatory default. Incorporate class-based grouping, mixture prioritisation and cumulative-loading analysis into standard procedure, with formal reassessment triggers where tank mixes, sequential applications, co-formulants or overlapping exposures make single-chemical assessments scientifically unrepresentative.
5. **Create an operational precaution framework under HSNO.** Publish a clear decision pathway showing how material uncertainty is to be handled. This should specify when uncertainty triggers additional data requirements, tighter controls, conditional approvals, targeted monitoring, reassessment or other protective action.

   Precaution must be operationalised through a clear and consistently applied decision-making procedure, specifying how material scientific uncertainty is identified, weighed and translated into regulatory action.
6. **Build monitoring-to-regulation feedback loops and reinstate Environmental Exposure Limits (EELs).** Establish formal pathways linking groundwater, surface-water, sediment, soil, residue and biomonitoring data to regulatory review. Monitoring must be sufficiently systematic to detect persistent, increasing and cumulative chemical loading, including contamination arising from repeated applications and multiple substances.

   Critically, reinstate substance-specific Environmental Exposure Limits as an operational component of hazardous-substance regulation. EELs must be derived from the environmental risk assessment for the specific representative use being authorised, using relevant ecotoxicological endpoints and predicted environmental concentrations for the application rate, frequency, method and receiving environment assessed.

   This creates a scientific chain of accountability: the representative use defines the exposure scenario; the risk assessment determines whether that exposure is acceptable; the EEL provides a measurable regulatory benchmark; and environmental monitoring tests whether predicted exposures and regulatory assumptions remain valid after release.

   Where monitoring identifies concentrations approaching or exceeding an EEL, persistent accumulation, unexpected environmental distribution or cumulative loading not captured by the original assessment, this should automatically trigger investigation, exposure reassessment and review of controls. Without measurable exposure limits and monitoring against them, regulators may know that a chemical is present but lack a defined mechanism for determining when environmental exposure has departed from the conditions under which its use was judged acceptable.

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7. **Require comprehensive pesticide-use reporting and exposure-relevant data collection.** New Zealand cannot adequately characterise environmental exposure without knowing what is being applied, how much, where, how often, by what method and in what combinations. Establish a national pesticide-use reporting system capable of linking actual use patterns with environmental monitoring and the representative uses assessed by the NZ EPA.

   These data should underpin exposure modelling, mixture and cumulative-loading analysis, resistance management and reassessment. They should also allow the EPA to identify where real-world New Zealand use has drifted beyond the application rates, frequency, combinations or environmental settings considered in the original risk assessment. Without use data, EELs and environmental monitoring operating together, risk assessment remains substantially assumption-based: the regulator cannot reliably test whether the exposure predicted when a substance was approved corresponds with the exposure occurring in the environment.

8. **Enable routine scoping of the global scientific literature**. Resource and train NZ EPA scientists to systematically search, evaluate and synthesise peer-reviewed evidence and key court findings concerning persistence, bioaccumulation, environmental fate, mechanistic toxicity, endocrine effects and long-term ecological outcomes.

   AI-assisted evidence synthesis should support, not replace, scientific judgement. Regulatory knowledge should not be confined to applicant dossiers or summaries prepared by overseas authorities.

9. **Modernise endocrine-disruption governance.** Develop explicit policy addressing evidence beyond traditional EATS pathways, including developmental windows of vulnerability, neurodevelopmental effects, non-monotonic dose responses and evolving New Approach Methodologies. The Authority should state clearly how uncertainty in this field will influence regulatory decisions and controls.

BACKGROUND TO THIS POLICY

[1] PROBLEM(S) DEFINITION

The Hazardous Substances and New Organisms Act 1996 (HSNO) is protective and preventive, and explicitly requires precaution under scientific/technical uncertainty, yet New Zealand's Environmental Protection Authority (the NZ EPA) - its actions and operational machinery - has trended toward administrative defensibility, reliance on applicant dossiers, and overseas defaults rather than a sustained, NZ-specific, learning system.

The term 'pesticides' is a broad umbrella covering a wide spectrum of plant and biocidal substances designed to control unwanted organisms. It includes herbicides (weeds), insecticides

(insects), fungicides (fungal pathogens), rodenticides, nematicides, molluscicides, and bactericides, as well as seed treatments, desiccants, and growth regulators. Some are synthetic chemicals; others are biologically derived or microbial agents. What unites 'pesticides' or 'biocides' is not their chemistry but their purpose: to suppress or eliminate organisms that interfere with crop production, forestry, amenity use, or public health.

From a stewardship perspective, this diversity matters because each class carries distinct ecological, toxicological, persistence, and resistance dynamics, yet all fall under the single regulatory label of 'pesticides'.

(a) NZ EPA: Stepping Away from Formal Risk Assessment & Public Feedback

Hazardous substances behave differently depending on formulation, geography, cumulative exposure history, and biological vulnerability, yet these contextual factors are not consistently integrated into assessment practice.

Risk assessment is important as it shows not only the hazard but the risk of a chemical. The main regulatory 'instruction manual' is an industry-applicant *facing Risk Assessment Methodology for Hazardous Substances (December 2022)* (Methodology 2022) paper.[1]

The paper was drafted in the months following an extensive glyphosate consultation, where many of the submitters drew attention to persistent challenges with legacy regulatory approaches.

GOOD REGULATION: EVALUATING BOTH HAZARD *AND* RISK.

In simple terms, a **hazard** is the inherent ability of a substance to cause harm, for example, whether a chemical can cause cancer, disrupt hormones, or damage ecosystems. A **risk** is the likelihood that harm will actually occur in real life, which depends on how much of the substance people or the environment are exposed to, how often, and under what conditions. This requires local monitoring to understand local conditions and influences.

A chemical can be hazardous but pose low risk if exposure is tightly controlled; equally, even a moderate hazard can become a serious risk if exposure is widespread or poorly managed. Good stewardship requires understanding both. Focusing only on hazard ignores real-world exposure patterns; focusing only on risk without properly identifying hazards may miss long-term or cumulative harms. Assessing both together ensures that decisions are grounded in how substances behave biologically and how they are actually used, supporting public health, environmental protection, and the wider public interest.

The *Methodology* (2022) relies on standardised soils metrics, default exposure scenarios, and internationally derived guidance values without also requiring that NZ EPA staff source local data. The Methodology reflects a conventional industry-toxicology approach. Many concepts were out-

[1] NZ EPA (December 2022). Risk Assessment Methodology for Hazardous Substances. How to assess the risk, cost, and benefit of new hazardous substances for use in New Zealand.

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dated at the time of publication, suggesting an under-resourced agency that struggles to comprehensively evaluate and update information.

The Methodology doesn't sufficiently integrate a pathway that ensures officials will evaluate both hazard *and* risk, particularly, and this is key. There is no feedback loop from the agriculture or industry sector, from the science community, to update and keep the NZ EPA abreast of New Zealand conditions (including soil type, temperature, rainfall) and use (for example in a tank mix with other formulations, or quantity and repetitiveness of use) and the actions of pesticides, including all formulations applied over a growing season. There's no evidence of officials investigating whether the default exposure scenarios, for example reflect real world conditions in across New Zealand, in the varying regions where pesticides are sprayed.

The NZ EPA has largely stepped away from undertaking comprehensive risk assessment, including the evaluation of both hazards and risks, and including reviews of the scientific literature to identify new knowledge, including at low-dose endocrinologically relevant levels, including to deepen staff knowledge of the mechanistic knowledge of how a hazardous substance may impact cellular function, from water and soil microbiota up through the food chain, to human effects.

(b) Modified Reassessments

But when the NZ EPA defaults to offshore decisions when making a modified reassessment (which is frequently reflective of a relatively narrow, dossier-based exercise, as no broader literature search tends to be undertaken), it does not necessarily *also* tighten controls like that jurisdiction does. It shows, we have many pesticides in our environment that are banned or more tightly regulated than Europe, for example (Hageman et al 2019).

The glyphosate story is useful here not because it is unique, but because it is a clean case study of how these system features play out over the longer term: high use, occupational exposure plausibility, strong public contestation after 2015, no formal (comprehensive) risk assessment; and yet persistent difficulty translating contestation and new science into an up-to-date comprehensive, locally grounded risk assessment and updated controls.

Glyphosate may be one of the most commonly used pesticides in New Zealand, but it has never undergone a full risk assessment, in the 50 years it has been used here. What is often not publicly acknowledged but is important example of 'lost in translation' effects, is that Europe's glyphosate's controls are much tighter than New Zealand. Frequency of sprays are limited, and spraying in public areas, including roadsides, is not approved.

Hence, simply drawing on Europe's 'information' to prove 'the science' is settled and that there is no 'new knowledge' is one thing, but then following European steps to more tightly regulate the substance to keep farmers, growers, soils, groundwater, bystanders safe is another matter.

Modified reassessments should not be the 'go-to' when modern analytical tools including AI, data management and mining systems, including advanced monitoring analytics can be integrated into day-to-day operations. Modified reassessments tend to be industry friendly, because they are ignoring key processes to do with assessing risk:

- Industry data is the key information used. Staff do not routinely scope the literature to see what is 'missing' i.e. what new evidence of hazard and risk is emerging.
- NZ EPA staff are not integrating monitoring data from New Zealand but depending on offshore frameworks and assumptions that might not reflect New Zealand conditions.
- The EPA may cite the science but might not adopt the tighter regulatory stance that was then enacted by an overseas jurisdiction, following a their formal risk reassessment.

With nearly $60 billion in agricultural exports, the chemical industry financially benefits as an input supplier for farmers and growers, and therefore has a strong footing in New Zealand.

The pesticides industry utilises a broad variety of political practices to secure preferential treatment or that prevent, shape, circumvent, or undermine public policies (or a combination of the above) in ways that further corporate interests' (Gilmore et al 2023; Schölin et al 2025).

(c) Exclusive Reliance on Industry Levies can Encourage a Service Culture

The NZ EPA should not exclusively be funded from chemical industry fees for its scientific work. The difficulty arises when the same industry that is subject to regulation is also the primary funder of the regulator's scientific and technical capacity.

Over time, fee-for-service funding can subtly reorient an agency's posture. Daily correspondence, data updates, modified reassessments, and application processing become the routine centre of gravity. Officials interact repeatedly with the same applicants and technical consultants. Relationships become collegial and efficient, which is not inherently improper. However, repeated cooperative engagement can normalise an 'application servicing' mindset rather than a 'public-interest stewardship' mindset.

In effect, the institution becomes aligned with industry applicant 'needs'. When core scientific capability depends largely on industry-derived revenue, incentives can drift toward prioritising timely processing of applications; limiting discretionary investigations that would exceed the budget generated by fees; avoiding expansive reassessments that disrupt regulated sectors; limiting regulatory questions to within existing rules and norms that will not be contested by industry applicants; and cease requiring comprehensive pesticide use reporting.

(d) Failure to translate the boundaries of overseas risk assessments into New Zealand controls

A key problem with the NZ EPA's approach is that it can rely on the conclusions of overseas regulators without making sufficiently clear that those conclusions are conditional. That is, the controls and rules that for example, the European Food Safety Authority (EFSA) put in place, are the result of risk assessment based on a particular 'reference use' have not been adopted for use by the NZ EPA.

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The NZ EPA cites EFSA to state that there is no new information, but is not transparent, that as the information has changed since EFSA's early 2009 assessment, EFSA has progressively tightened controls. New Zealand's controls have largely not changed in that same time.

A pesticide risk assessment does not establish that a chemical is simply 'safe'. It asks whether specified uses are expected to produce acceptable risks under defined conditions.

Those conditions include the crop or setting in which the pesticide is used, the amount applied per hectare, how often it is applied, the application method, predicted movement into soil and water, and the regulatory controls imposed. Change those conditions and the exposure changes. Once exposure changes materially, the original risk conclusion may no longer apply.

The NZ EPA's own framework permits consideration of overseas assessments but does not provide a clear methodology for determining whether overseas assumptions and controls remain applicable to New Zealand's different use patterns.

A recent NZ EPA response[2] to a request for risk assessment demonstrates the significance of this problem particularly well.[3] [4] EFSA's recommendations for use (controls) have become progressively stricter in the years since the International Agency for Research on Cancer declared that glyphosate was probably carcinogenic.[5] [6]

While the 2009 EFSA assessment was less prescriptive, the 2015 and 2023 assessments have very specifically tightened permissions. The permissions are very clearly tied to the representative use patterns that were studied and evaluated in the risk assessment.[7] [8] [9]

Therefore, EFSA permits less applications per annum, and lower applications than New Zealand. European regulatory authorities are much stricter on values in water, including freshwater and sediment.[10]

The 2015 EFSA review assessed a maximum cumulative application of 4.32 kg glyphosate active substance per hectare per year, with substantially lower rates for many uses. By 2023, the representative agricultural uses underpinning the European assessment were generally limited to 1.44 kg active substance per hectare in any 12-month period, although some assessed scenarios

[2] Glyphosate is discussed more broadly in Chapter [10].
[3] ELI. Challenging the EPA's regulatory failure on glyphosate
[4] EPA Assessment Report (April 2024) Grounds for reassessment of glyphosate and glyphosate-containing substances APP204718. https://www.epa.govt.nz/assets/FileAPI/hsno-ar/APP204718/APP204718-Grounds-for-Reassessment-EPA-Assessment-report.pdf
[5] International Agency for Research on Cancer. Some organophosphate insecticides and herbicides: tetrachlorvinphos, parathion, malathion, diazinon and glyphosate. Lyon, France: IARC, 2015.
[6] IARC WHO. (March 20, 2015). Information release. IARC Monographs Volume 112: evaluation of five organophosphate insecticides and herbicides
[7] EFSA (2009) Submission of scientific peer-reviewed open literature for the approval of pesticide active substances.
[8] EFSA (2015), "Conclusion on the peer review of the pesticide risk assessment of the active substance glyphosate." EFSA Journal 13(11):4302.
[9] EFSA (2023), Peer review of the pesticide risk assessment of the active substance glyphosate. EFSA Journal 21(7):8164.
[10] EC (December 2022). SCHEER - Scientific Opinion on "Draft Environmental Quality Standards for Priority Substances under the Water Framework Directive" – Glyphosate.

extended to 2.16 kg/ha. These are not incidental label details. They are part of the exposure conditions against which risks to soil, water, plants and animals were calculated.

New Zealand has not followed that regulatory trajectory. The 2009 ERMA assessment that subsequently became the principal representative assessment for glyphosate products established a maximum application rate of 7.56 kg glyphosate acid per hectare per application – levels similar to this remain in place today. [11] [12] In addition, there is no annual cumulative limit, which is a limit noted by EFSA.

More importantly, the quantitative modelling supporting that decision estimated concentrations in surface water arising from spray drift and runoff from treated land. It did not separately model the exposure created when the herbicide itself is intentionally applied directly onto or into water. Thus, even at the agricultural level, there is a regulatory inconsistency: New Zealand can point to contemporary European conclusions while retaining use patterns that extend considerably beyond the rates and exposure assumptions underpinning those conclusions.

The problem becomes much more serious in wetlands. EFSA's 2023 ecological assessment considered terrestrial representative uses such as pre-plant weed control, orchard and vineyard applications, shielded spraying between vegetable rows, railway treatment and spot treatment of invasive weeds. It did not assess aerial broadcast application directly onto wetlands, standing water or aquatic vegetation.[13] [14] Its aquatic risk conclusions were instead derived by modelling how much glyphosate might reach surface water indirectly through pathways such as spray drift. In regulatory terms, these are fundamentally different exposure scenarios. A calculation asking how much spray drifting from a field might enter a pond cannot establish the safety of deliberately spraying the pond itself.

Yet New Zealand permits precisely this broader type of use. The Polaris 450 label, for example, contains directions for drains and waterways and permits boom or aerial treatment of willow at 7 L/ha. The approval does not identify a separate quantitative environmental risk assessment for this direct aquatic exposure, nor an aquatic-specific application limit reflecting the very different exposure produced when the receiving environment is itself the treatment area.

Operational requirements concerning trained applicators, drift management or how spraying is undertaken cannot fill this scientific gap. They may reduce mistakes during application, but they cannot demonstrate that exposing an entire wetland, its sediments, aquatic organisms and food web to the formulation is environmentally acceptable where the underlying representative use has never been assessed.

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[11] ERMA (2009) Evaluation and Review Report. Application for Approval to Import or Manufacture GF-1280 for Release, Application Number: ERMA200031

[12] ERMA (December 21, 2009). Decision. To import or manufacture GF-1280 as a herbicide for commercial use for the non-selective control of many annual and perennial grasses and broadleaf weeds in a wide range of situations. Applicant Dow AgroSciences. ERMA200031

[13] EFSA (2023), Peer review of the pesticide risk assessment of the active substance glyphosate. EFSA Journal 21(7):8164.

[14] 2023/2660. COMMISSION IMPLEMENTING REGULATION (EU) 2023/2660 of 28 November 2023 renewing the approval of the active substance glyphosate in accordance with Regulation (EC) No 1107/2009 of the European Parliament and of the Council and amending Commission Implementing Regulation (EU) No 540/2011. Official Journal of the European Union. Nov 29, 2023.

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This is why the EPA's 2024 reliance on overseas regulatory conclusions is potentially misleading. The issue is not that EFSA failed to assess glyphosate. On the contrary, Europe has undertaken increasingly detailed assessments and has progressively constrained the uses and application rates under which acceptable risk was established.

The problem is that New Zealand takes reassurance from those assessments without consistently importing the boundaries that give the reassurance scientific meaning. The EPA itself concluded that the available information did not indicate a change in risk warranting altered glyphosate controls, but did not clearly distinguish the narrower overseas representative uses and controls from New Zealand's broader permissions.

The reform required is therefore straightforward in principle. Whenever the NZ EPA relies on an overseas assessment, it should identify the precise representative uses, application rates, annual frequency, formulations, exposure pathways and controls that underpin the overseas conclusion, and compare them explicitly with those permitted in New Zealand.

Where New Zealand use falls outside that assessed envelope, the overseas conclusion should not be treated as evidence that the additional use is safe. The EPA must either adopt equivalent restrictions or undertake the additional risk assessment. In the case of direct broadcast glyphosate application onto wetlands, the present problem is more fundamental still: there is no overseas representative environmental risk assessment to defer to. The scientific assessment required to establish the safety of that use has simply not been done.

Please refer to Chapter [10] for more discussion on the regulation of glyphosate-based herbicides.

(e) The Absence of Science for Routine Monitoring & Evaluation of Mixtures

A recent study Scarcity of pesticide data in New Zealand with a focus on neonicotinoids (Tai et al. 2025) highlights this fundamental weakness in New Zealand's understanding of pesticides: the absence of comprehensive, publicly accessible pesticide usage and exposure data. The authors make clear that there is no centralised system tracking how much and where pesticides, including neonicotinoids, are used in New Zealand, leaving regulators and scientists without a clear picture of real-world application patterns or trends.

The Parliamentary Commissioner for the Environment has extensively assessed the problem of the absence of monitoring data and information in New Zealand, and has made many recommendations to support widespread, government reform.[15] [16]

This lack of basic usage data means that even simple exposure questions, what quantities are applied, how often, in which landscapes, and in combination with what other products, remain unanswered. Without that foundation, neither hazard nor risk can be reliably assessed. Instead, regulation tends to focus narrowly on specific application routes (e.g., foliar spray risk to honey

[15] Parliamentary Commissioner for the Environment (2022, March) Knowing what's out there: Regulating the environmental fate of chemicals. Wellington: Parliamentary Commissioner for the Environment.
[16] Parliamentary Commissioner for the Environment (July 2026). Unlocking New Zealand's Environmental information. ISBN 978-0-473-79655-6 (online)

bees) while overlooking broader exposure pathways (e.g., soil persistence, residues taken up by underground native bees, or movement through water and non-target systems).

The study also shows that New Zealand's patterns of use differ markedly from those in Europe and North America, yet regulatory approaches remain heavily influenced by overseas assumptions rather than NZ-specific evidence. The implication is stark: without local data, regulators are largely managing assumptions, not measured realities. This undercuts the ability to prioritise surveillance, to model cumulative or mixture exposures, and to anticipate resistance dynamics or neurological/ecotoxicological outcomes in a nuanced way.

The absence of systematic pesticide data undermines the very basis for risk assessment. It exemplifies the broader theme of weak scientific infrastructure and regulatory reliance on international defaults, which compromises both precaution and the capacity to evaluate real-world human and environmental exposures.

[2] CHEMICAL MIXTURES: ADDITIVE & SYNERGISTIC RISKS

The first problem is mixture reality: additive and synergistic risks, class effects, and long-tail loading. The European Environment Agency's *Late lessons from Early Warnings* (2013) publication is now over a decade old. It is a long, sober record of regulators learning late, often after widespread exposure, because early warnings were discounted, uncertainty was treated as a reason to delay, and complex exposures were simplified.

The *Risk Assessment Methodology for Hazardous Substances (December 2022)* is heavily model-centred. It draws on non-local exposure modelling parameters, default assumptions, and quantitative risk tools, applicants are expected to provide the data and justification, with EPA supplementing 'where needed'. The use of standardised soils, exposure scenarios, and foreign guidance values is emphasised and the document views the industry applicant as the primary source of risk and benefit information for its own hazardous substances that it is seeking approval and reauthorisation for. There is no instruction for officials to conduct a literature review to identify the latest scientific evidence that might highlight new mechanistic pathways, cohort signals, developmental windows of vulnerability, or low-dose and endocrine-system effects from the active ingredient and chemical formulation that is under discussion or review.

In 2026, New Zealand regulators have failed to scientifically address the concerns of this paper in relation to New Zealand risk. Mixture rules tend to cover additivity, but they do not reliably capture synergy, potentiation, or class-based cumulative burdens, and the architecture remains substance-by-substance. By contrast, Europe has implemented cumulative risk assessment (CRA) methodologies for pesticide residues using cumulative assessment groups and monitoring data, including for maximum residue levels of pesticides.

Europe revised its bee guidance in 2023, expanding exposure pathways and tiering approaches and moving towards a broader approach that encompasses chronic exposures, sublethal effects, and landscape-scale exposure. Europe also replaced its earlier birds-and-mammals guidance, including a revised framework in 2023 which now includes diverse feeding behaviours, landscape exposure, and indirect pathways. Europe also improved its human exposure assessment in 2022

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to include not just operators and workers, but residents and bystanders, with updated assumptions and exposure pathways.

Glyphosate illustrates the mechanism: real agronomy increasingly involves tank mixes to manage resistance, so 'single active' evaluation becomes less representative of real exposure conditions. The NZ EPA has not addressed the cumulative toxicological issue that includes risk to farmers and growers, and risks from roadside applications. When the evidence of risk from human exposures and potential bioaccumulation (including from its breakdown products, including heavy metals in the full formulation) as the active ingredient and its formulation co-ingredients persist, the lack of movement by Authority scientists to address the environmental and human health risks is concerning.

Stewardship must ask about loading trajectories over time, not just compliance with single-chemical thresholds in abstract model worlds.

[3] PRECAUTION: NO POLICY SUMMARIES TO SUPPORT DECISION-MAKING

The second problem concerns *precaution* which is embedded in law, but which has not been systematically deepened into documentary form as a working decision system. The HSNO Act requires that officials take a Precautionary approach (S.7):

> *All persons exercising functions, powers, and duties under this Act … shall take into account the need for caution in managing adverse effects where there is scientific and technical uncertainty about those effects.*

Decision-makers 'are required to take a cautious approach' where scientific or technical uncertainty exists, with an overall statutory logic of prevention of harm and protection of life-supporting systems.

Yet the literature to support officials when dealing with uncertainty is negligible.

The strength of precaution lies not in invoking caution, but in equipping decision-makers to act responsibly when knowledge is incomplete. Ensuring that capability exists is central to maintaining public confidence, environmental stewardship, and the integrity of statutory decision-making under HSNO.

The *Methodology* (2022) document does not provide such a pathway. It explains the different types of uncertainty, and notes various types of uncertainties which relate to various models, but it does not provide any direction for officials when dealing with uncertainty where there are threats of serious or irreversible damage, i.e. where harm from an activity could plausibly occur.

> *Lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.*

There is no pathway for decision-makers to operationalise when there is scientifically plausible but uncertain. Judgements of plausibility can be grounded in scientific analysis.

Academic analyses of precaution in New Zealand environmental law have emphasised that precaution must be operationalised through structured decision tools to avoid inconsistent or ad hoc application. The current framework appears to provide discretion rather than a systematic architecture for precautionary reasoning.

Various documents have been used or have been referred to these analyses in the past, yet precaution, in the decades since the HSNO Act was established, has not been operationalised in policy (Voigt 2002; Scott 2016; Iorns & Scott 2017; Iorns Magallanes 2018; Iorns Magallanes & Scott 2020).

Policy and guidance documents which provide scientifically robust, investigative steps could include: commissioning independent evidence synthesis from subject matter experts, conducting literature reviews to improve the understanding of the behaviour dynamics of the substance; screening offshore jurisdictions for newer guideline material on dealing with precaution and uncertainty, integrating monitoring, or setting triggers that require escalation when uncertainty is material. These documents would then be updated to include case studies of recent decisions where officials considered that the evidence was uncertain but that there was plausible evidence of harm should the activity continue.

Precaution in complex regulatory environments requires more than acknowledging uncertainty; it requires institutional practices that encourage exploration of unknowns, iterative reassessment, and transparency about evidentiary gaps. The available materials do not clearly demonstrate a structured methodology for characterising uncertainty, weighting emerging evidence streams, or triggering precautionary reassessment where scientific understanding evolves.

[4] PESTICIDES: SHIFTING FROM RESISTANCE MANAGEMENT TO AN IPM APPROACH

(a) The Limits of the Pesticide Treadmill: Resistance & Toxic Tank Mixtures

A crucial context that is often downplayed, is the historic and continued problem of pesticide resistance (See Heap for herbicides resistance). Over time, weeds, insects and organisms adapt to repeated chemical use and evolve resistance, so the product that once worked no longer does. This cycle, often called the ‘pesticide treadmill’, drives the use of higher doses, more frequent applications, or combinations of products.

One common response is the use of tank mixes: multiple chemicals with different modes of action applied together to delay resistance. Yet the environmental persistence, bioaccumulation, and combined toxicity of these multi-chemical formulations, used routinely by farmers and applicators, are rarely assessed in a cumulative or systems-based way. In practice, the real-world mixture becomes normalised, while hazard and risk evaluation remains largely single-substance focused.

Looking ahead, biotechnology is increasingly presented as the next solution. For example, gene-edited organisms designed to act *in situ* in crops or ecosystems. But evolutionary pressure does not disappear; resistance can emerge to biological tools as well. That means the treadmill

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dynamic may simply shift form. Unlike conventional chemicals, however, genetically modified or gene-edited organisms introduce additional layers of complexity: they can replicate, spread, and potentially transfer heritable traits.

For GMOs including gene edited organisms, questions of persistence and bioaccumulation are replaced by questions of ecological interaction, gene flow, and long-term evolutionary consequences. These are qualitatively different risks - not necessarily greater, but more complex and potentially enduring, and they require a regulatory framework capable of anticipating system-level effects, not just immediate efficacy.

(b) What is Integrated Pest Management (IPM)?

For pesticide regulators, understanding Integrated Pest Management (IPM) is foundational to responsible chemical stewardship. When regulators grasp the power of IPM, risk assessment becomes more balanced. The 'benefit' side of the equation is no longer defined narrowly as chemical efficacy, but as long-term system stability. That understanding supports precaution, reduces dependency cycles, and aligns chemical regulation with sustainable land stewardship.

IPM recognises and situates pest control as a systems problem rather than a product problem. Instead of asking 'Which product works best?', it asks 'How does this whole system function, and how do we manage it intelligently over time?'

IPM brings together ecology, soil health, crop rotation, biological controls, habitat design, monitoring, thresholds, and, only when necessary, targeted chemical use. It is formidable not because it is complicated for its own sake, but because it requires understanding living systems rather than simply applying inputs.

It integrates biological controls, crop rotation, soil management, habitat diversification, mechanical control, resistant cultivars, monitoring, and threshold-based decision-making before resorting to chemicals.

For regulators, that depth matters. IPM demonstrates that chemical control is rarely the only tool available and often not the most durable one. By diversifying control strategies, IPM reduces resistance pressure, lowers cumulative chemical loading, and builds resilience into agricultural systems. In other words, it strengthens both productivity and environmental protection.

IPM adds to agricultural decision-making for three interlocking reasons.

a. First, persistence, bioaccumulation, and toxicity cannot be ethically evaluated in a vacuum. If safer or lower-impact management strategies exist, even if they require knowledge transfer, system redesign, or staged transition, regulators must understand them to properly weigh risk–benefit decisions.

   Without IPM literacy, the 'benefit' side of the equation can become narrowly defined as yield protection via chemical application, rather than resilience-based control through diversified systems. A regulator unfamiliar with IPM may inadvertently treat chemical reliance as inevitable, when in fact it is often contingent.

b. Second, pesticide resistance underscores why chemical defaulting is unsuitable, if public short and long-term human and environmental health are taken into account. The 'pesticide treadmill' is well documented: repeated chemical exposure selects for resistant weeds and insects, leading to higher doses, tank mixes, or new active ingredients. This creates escalating chemical complexity and potentially greater cumulative exposure and mixture effects.

   IPM is explicitly designed to slow resistance evolution by diversifying selection pressures. If regulators do not integrate resistance ecology and IPM strategies into their assessment frameworks, they risk approving or maintaining chemicals in ways that accelerate resistance, thereby increasing long-term environmental loading and hazard exposure.

c. Third, IPM knowledge sharpens precaution. A regulator charged with protecting environmental and human health must understand when chemical control is genuinely necessary and when it is substitutable. Precaution is not prohibition; it is proportionality under uncertainty. IPM provides the technical basis for proportionality because it expands the range of practicable alternatives.

Without that knowledge, regulators may feel compelled to accept higher chemical risks on the assumption that there are no workable alternatives, an assumption that is often incorrect.

Where regulators lack deep familiarity with IPM, regulatory assessments can drift toward evaluating chemical efficacy and toxicity in isolation, rather than situating pesticides within the broader spectrum of viable management tools.

Weaving IPM knowledge into the regulatory framework would elevate decision-making in several ways:

- ✓ It would inform benefit–risk assessments with realistic non-chemical or reduced-chemical comparators.
- ✓ It would strengthen conditions of approval (e.g., requiring resistance management plans consistent with IPM principles).
- ✓ It would allow regulators to assess cumulative and mixture exposures in light of actual field practices.
- ✓ It would align chemical regulation with long-term soil health, biodiversity, and water quality objectives.
- ✓ It would create a coherent bridge between environmental protection and sustainable agriculture policy.

(c) Install an NZ EPA IPM & Resistance Ecology Advisor as a Principal Scientist

MNZH recommend that the new CEO appoints (or recruits) a Senior Integrated Pest Management and Resistance Ecology Adviser at a principal scientist level. This individual should:

- Have deep expertise in weed/insect ecology, resistance evolution, and systems-based pest management.
- Be conversant in agronomic realities (forestry, horticulture, arable, pastoral systems).

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- Work alongside toxicologists and exposure scientists to ensure chemical decisions are contextualised within integrated management options.
- Liaise formally with agricultural research institutes, universities, and extension bodies.
- Contribute to risk assessment by providing an integrative, evidence-based analysis of feasible IPM alternatives and resistance implications.

The principal scientist role would be supported by dedicated budgetary resourcing and commissioning authority to identify and address strategic knowledge gaps across agricultural, forestry, and conservation systems, including the power to commission and advance independent research, pilot programmes, field trials, and evidence syntheses that advance the integration of IPM across the New Zealand landscape.

This resourcing should enable proactive system mapping, resistance monitoring, cross-sector collaboration, and translation of science into regulatory and operational guidance, rather than leaving the role dependent on ad hoc funding or reactive analysis.

Institutionally, this role would support regulatory functions by:

- Improving the quality of benefit–risk evaluations.
- Reducing over-reliance on chemical efficacy claims.
- Informing precautionary conditions and adaptive controls.
- Anticipating resistance-driven escalation before it becomes entrenched.

At a systems level, it would also facilitate integration across environmental and agricultural agencies. Instead of siloed regulation (inside the NZ EPA) and production advice (agriculture agencies), there would be a shared technical language around resilience, reduced chemical dependence, and long-term stewardship.

That integration is designed to strengthen national environmental objectives while maintaining agricultural productivity, aligning regulatory practice with both HSNO's protective mandate and sustainable land-use strategy.

[5] ENDOCRINE DISRUPTION: NO POLICY SUMMARIES TO SUPPORT DECISION-MAKING

The NZ EPA has not published documentation that demonstrates that the Authority has a fit-for purpose system to identify endocrine disruption that is a tool for Authority officials. The NZ EPA Risk Assessment Methodology for Hazardous Substances (2022) does not include specific information to support officials on the regulation and stewardship of endocrine disrupting compounds.

The Cawthron (2022) report Overview of Endocrine Disruption – An Aotearoa New Zealand Perspective, provides a competent descriptive overview of endocrine disruption science and recognises that uncertainty and evidentiary gaps justify a precautionary approach in chemical registration. The report clearly explains the biological mechanisms of endocrine activity, the limits

of current testing methods, and the challenges of detecting adverse outcomes at whole-organism or population levels. The report is primarily explanatory rather than reform-oriented

Advances in European Union pesticide risk-assessment practice by 2022, could have provided content which could have been included in the *Methodology* (2022) document or utilised and developed as a policy discussion document for officials, yet this does not appear to be the case. Endocrine disruption is a formal legal decision criterion (Commission Regulation (EU) 2018/605). Endocrine effects are not a discretionary consideration but a statutory decision trigger.

Instead, NZ EPA staff lean heavily on OECD GD150 / the OECD Conceptual Framework and the WHO/IPCS definition, and endocrine disruption-related conclusions are often definition-driven and threshold-based.

> The rationale for grouping effects is based on the 'Guidance Document on standardised test guidelines for evaluating chemicals for endocrine disruption. Series on Testing and Assessment No. 150' provided by the Organisation for Economic Co-operation and Development (OECD, 2018b) for their interpretation with regard to estrogenic, androgenic, thyroidal and steroidogenic (EATS) modalities and adapting the Joint Research Centre's (JRC) screening methodology to identify potential endocrine disruptors.' (EFSA 2018)

Non-EATS mechanisms (e.g. metabolic disruption) are treated as emerging areas that require regulatory discussion, debate and evaluation. Standard guideline tests may miss sensitive developmental windows and delayed life-course effects, limiting detection of early-life programming and long-term outcomes (Grignard et al., 2022). The framework also does not distinguish endocrine 'activity' from adverse endocrine-mediated effects. This leaves key determinations dependent on weight-of-evidence judgement (European Commission, 2020).

While this may be efficient for officials, if data are incomplete, the regulators can default to a 'no formal conclusion' finding, rather than increasing controls, requesting more data or conducting further enquiry, to ensure that precaution favours protection rather than inaction.

Recent papers have called to integrate new approach methodologies (NAMs), adverse outcome pathways (AOPs), and integrated testing strategies (e.g. Barton-Maclaren et al., 2022).

This is important to address, as the international 'state of the science' conversation has moved on. OECD's December 2025 report explicitly canvasses EATS and non-EATS endocrine disrupters and signals diversity of expert views. This is useful, but it is also an indicator of contested science.

The OECD GD150/CF provides a structured basis for assessment, yet to ensure that regulators can protect the environment, test methods have to evolve in line with current science, scientists have to have the flexibility to integrate evidence which may arise from different disciplinary perspectives, and must be able to take a precautionary approach in favour of restricting applications where scientific coverage remains incomplete but there is evidence for plausible harm.

When the science is not settled, a precautionary regulator must have a clear internal decision pathway. For example, the paper by regulatory scientists (Holmer et al., 2025) reveals that even in the European Union (EU), where endocrine criteria are more formally embedded, implementation

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debates persist, especially around New Approach Methodologies (NAMs) and linking mechanistic signals to adversity.

The NZ EPA must be concerned with governance. Officials require a locally-owned, published 'how we decide under uncertainty' pathway for EDCs, rather than episodic, submission-triggered analysis that lacks scientifically relevant expertise, and is at risk of being undermined by narrow evidentiary conventions that do not step into broader inquiry.

[6] SILENCE: AGRICULTURAL POLLUTION.

With nearly $60 billion in agricultural exports there is no integrated, regionally appropriate strategy to monitor and assess risk from agricultural pollution in soil, water and air. Without such information HSNO decision-making cannot be comprehensive.

As a case study, the ESR national groundwater pesticide survey is a rare long-run dataset (repeated sampling since 1990), yet its apparent regulatory use is narrow, supporting product-specific leaching warnings and label controls rather than cumulative loading analysis, class-based tracking, or mixture burden governance.

In Europe, groundwater policy treats pesticide mixtures as intrinsically relevant to public protection: the regulatory benchmark is 0.1 µg/L for any individual pesticide and 0.5 µg/L for the total of pesticides in a sample. Regional regulations to limit use and prevent further accumulation can then be enacted to limit further groundwater contamination and protect drinking water. No such aggregate approach exists in New Zealand. Similarly, while the NZ EPA will approve class-based reassessments, they are yet to recognise that the bioaccumulation of a single class of pesticides in soil or water constitutes the same risk as if a single active ingredient of that class had exceeded the threshold. This is an example of the Authority failing to step into a stronger stewardship position and protect the health of local communities.

Monitoring without translation cannot protect the environment. However, there does not appear to be a funded institutional bridge that can review the ESR data, and then convert these detection patterns into precautionary triggers, reassessments, or strengthened controls.

The CEO will also inherit a stark regional reality: regional variations in agricultural use: forestry, horticulture, arable, dry stock and dairy use, the different soils, different receiving environments and climatic effects result in radically different use profiles and exposure patterns.

The stewardship task is therefore not merely 'national standards', but a scientifically-relevant, interdisciplinary approach that has the rigor and intelligence to shift beyond a single chemical focus and consider the wider receiving-environment: including NZ geography, soils, rainfall, aquifers, and climate.

This has never been done. Instead, the *Methodology* (2022) presumes that overseas defaults are adequate proxies. The heavy reliance on standardised parameters and offshore defaults might be administratively defensible, but it is scientifically incomplete for HSNO's place-based protective purpose - if it is not reconciled with NZ exposure realities.

[7] SILENCE: URBAN WASTE STREAMS

The governance gap is not merely ‘the EPA doesn’t regulate everything’, but that New Zealand lacks an integrated programme that treats synthetic chemicals in wastewater and biosolids as a stewardship problem requiring cross-agency science leadership, technology development, and adaptive control over time.

Urban waste-water treatment plants do a lot of work to ensure that waste-water that is released into our rivers and sea is not microbiologically active and nutrient heavy. But the loading of man-made chemical mixtures and that risk into receiving environments is a quiet and largely unaddressed problem.

The NZ literature on pharmaceuticals and personal care products (PPCPs) in wastewater shows these residues are routinely detectable in influent, and removal is incomplete/variable depending on compounds and treatment processes, i.e., a classic case of continuous low-dose emissions that accumulate into ecological and public-health questions (Kumar et al 2019; Kumar et al 2019).

This is precisely the kind of domain where modern digital tools (systematic evidence mapping, screening-level mixture prioritisation, automated horizon scanning) can help NZ move from ‘we don’t know’, to ‘here are the highest-risk chemicals and pathways that warrant monitoring and controls’.

But the NZ EPA has not acted on the 2019 data, and historically has not stepped in to demand the funding and capacity to routinely monitor across a significant spectrum of chemical classes and synthesise the information and evidence for chemical emissions in waste streams, or demand that resourcing for this work is undertaken, and that reports are then generated and forwarded to the NZ EPA.

[8] ABSENCE OF FORMAL NZ-SPECIFIC RISK ASSESSMENT CAPACITY

The NZ EPA demonstrates a consistent inability to characterise real-world exposure, not just hazards. New Zealand's use of pesticides that are suspected carcinogens is high (t’Mannetje 2020). Here glyphosate is again an instructive case, but it is not the exception.

The absence of formal risk assessment and relative lack of any focus on real world exposures in New Zealand is a big black spot in regulatory oversight. The NZ EPA does not have systems for requiring the monitoring and testing of farmers, growers and applicators in industrial, sporting and urban environments, to understand occupational exposure risk and the importance of mixture/tank-mix reality for applicators. The above sections showed how no work is being undertaken to understand regional agricultural use and to understand chemicals being released in urban waste water. These are large, problematic gaps in the Authority’s capacity to protect human and environmental health and to inform risk assessment.

If exposure is not being measured and model assumptions are not being tested against NZ biomonitoring/environmental monitoring, ‘risk assessment’ is superficial and cannot address New Zealand scenarios and fulfil the overarching obligations of the HSNO Act.

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[9] OVER-RELIANCE ON MODIFIED REASSESSMENTS.

Modified reassessments appear to have replaced risk assessment. Modified reassessments lean heavily on industry-supplied data and overseas regulator positions, with limited systematic review of the open scientific literature. The studies supplied by industry applicants are often not published, and the data that provides the rationale for industry claims is not shown.

With the modified reassessment process, applicants control the initial flow of data; guideline/GLP studies are privileged via reliability scoring. However, reliability scoring does not address whether the study is appropriate for hazard and risk evaluation in 2026.

In contrast, the requirement that officials review the peer-reviewed literature and mechanistic science are discretionary and therefore vulnerable to under-weighting; and co-formulants/formulations and mixture effects can be left under-characterised. In practice, officials do not conduct literature reviews where they use a declared method to systematically evaluate the science on the different risk pathways of a pesticide.

NZ EPA officials have also ignored the policy significance of court-disclosed evidence (e.g., for example in the Pilliod glyphosate trial where dermal exposure dynamics can be longer-lived than assumed).

The ignorance of information uncovered in the discovery process, that meaningfully add to real world evidence, in combination with the capacity of an integrated literature review to shed light on the mechanistic effects that increase the evidence for the plausibility of outcomes identified in the case, cohort and epidemiological literature, suggests that NZ EPA officials lack capacity, the institutional culture or the managerial approval to look further. Epidemiologist Professor Dave McLean discussed the absence of the use of epidemiological data by the NZ EPA in his book Pesticides and Health: How New Zealand Fails in Environmental Protection.

[10] CASE STUDY OF WIDER SYSTEM FAILURE: GLYPHOSATE

(a) No Risk Assessment of a Common Herbicide

Glyphosate's regulatory footing in New Zealand is historically thin. It sits on a 50-year old transfer into HSNO (a grandfathering mechanism) and later administrative reissuing to align classifications with updated GHS rules, rather than a contemporary, NZ-specific reappraisal of hazards, exposures, and risk management under present-day use. That distinction matters because 'lawful approval' can be the product of legacy continuity, not of modern, scientifically-relevant scrutiny.

(b) After the IARC Cancer Finding: Still no Risk Assessment despite Public Calls

The International Agency for Research on Cancer (IARC) (2015) finding that glyphosate was 'probably carcinogenic to humans', was a global signal that the scientific conversation had shifted. It did not compel a legal outcome in New Zealand, but it did sharpen the public-law question: when a credible international hazard authority changes the framing, does a protective statute like HSNO expect the regulator to revisit the substance in NZ conditions, or can the system continue to rely on inherited approvals unless a very high threshold is met?

EPA's post-2015 posture, as perceived by critics, illustrates a recurring pattern in chemical governance: the agency commissions or cites reviews that are explicitly not reassessments, then treats the resulting position as effectively dispositive unless new evidence crosses a demanding gateway. The Temple Cancer review (2016) which was published to rebut the IARC finding, was not a reassessment.[17] The subsequent critique by senior public health scientists and epidemiologists (Douwes et al. 2018) critiqued the reliance by the Temple on an earlier European Food Safety Authority (EFSA) report, which was markedly flawed as it had heavily relied on industry-funded and industry-manipulated reviews.[18] The Temple paper additionally lacked discussion of NZ exposures which are relevant to judging risk and hazard.

The critique by *Douwes et al* was not a rhetorical objection; it was a technical complaint by scientists with expertise in public health: over-reliance on overseas regulator conclusions, constrained engagement with contested bodies of evidence, and lack of NZ exposure analysis that could allow hazard signals to be translated into risk and controls.

The NZ EPA's 2021 Call for Information on glyphosate (CFI) looked, on the surface, like a democratic corrective, a channel for practical proposals and local knowledge. As a consequence, submitters to the Call asked for measures that would materially change exposure: restricting retail availability, requiring trained use, limiting application in public spaces, controlling co-formulants like surfactants, tightening signage/notification, and constraining use on food crops.

Yet the CFI was framed as voluntary, and EPA stated it did not verify submitter claims.[19]

The deeper critique is that the exercise produced no visible regulatory reform: there is no public evidence of binding HSNO control amendments being enacted following the process to implement submitter proposals, and no transparent scientific evaluation showing which proposals were tested, rejected, or prioritised and why. This was consultation without evaluative follow-through, perhaps viewed internally as a process to ensure reputational management, following the Douwes criticisms.

[17] Temple, W. (2016). Review of the evidence relating to Glyphosate and Carcinogenicity. August 2016. Wellington: New Zealand Environmental Protection Authority.
[18] Douwes, J., 't Mannetje, A., McLean, D., Pearce, N., Woodward, A., & Potter, J. (2018). Carcinogenicity of glyphosate: why is New Zealand's EPA lost in the weeds? New Zealand Medical Journal, 82-89
[19] NZ EPA (May 11, 2022). Glyphosate in Aotearoa New Zealand. Summary report on the call for information.

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Requests for formal risk assessment of glyphosate have repeatedly stalled at the 'grounds' stage, - the NZ EPA appear operationally closed to new information unless evidence is presented in a regulator-preferred format.

The Douwes et al paper which called for risk assessment was ignored by the NZ EPA, member of Parliament Steffan Browning called for formal risk assessment. The Associate Minister for the Environment also requested that the EPA consider reassessing glyphosate, and the NZ EPA refused.

(c) Recent Application for Glyphosate Risk Assessment Rejected

Then, in February 2023 the Environmental Law Initiative applied to the NZ EPA to determine if there was grounds for a formal risk assessment. The NZ EPA rejected their application (July 2024). In September 2024 ELI made an application for Judicial Review of that July decision. In October 2025, the High Court upheld the Environment Protection Authority's (EPA) decision not to reassess glyphosate.

ELI's move into formal process is best understood as an attempt to force the system to do what the CFI did not: confront the statutory question of reassessment. ELI sought to open the gateway under HSNO s 62 on the basis of significant new information. That strategy implicitly recognises a hard reality: under HSNO, the regulator is not obliged to reassess simply because controversy exists; it is obliged only when the legal threshold is met.

EPA's rejection of ELI's application turns on 'significance', and on the mechanics by which significance is judged. 'New' information can be acknowledged and still deemed insufficient if it does not dislodge EPA's existing risk view, especially when overseas regulators have maintained their conclusions and when reliability scoring diminishes the weight of contested literature.

This is where the critics' complaint' about 'modified risk assessment' bites: if the agency's frame effectively requires evidence to look like an industry dossier or an overseas regulator's endpoint, then the gateway may filter out precisely the sort of public-interest evidence that signals uncertainty, cumulative exposure, vulnerable subgroups, or formulation-based toxicity.

(d) High Court finds in Favour of NZ EPA

ELI consequently lodged an appeal, contending that the High Court had erred in finding the EPA's decision lawful. Its grounds included the Court's treatment of s 62 of the Hazardous Substances and New Organisms Act 1996 (HSNO) as a highly discretionary administrative power; acceptance of the EPA's high threshold for 'significant new information'; endorsement of the EPA's weight-of-evidence approach; insufficient application of HSNO's precautionary and other Part 2 principles; and inadequate consideration of glyphosate-containing substances. ELI also raised the important question of how 'significant new information' could properly be determined where no prior New Zealand risk assessment of glyphosate could be identified. (See Appeal Grounds on the ELI website).

Courts do not ordinarily determine whether glyphosate is scientifically safe. Judicial review asks whether the statutory decision-maker acted lawfully. Courts are also generally cautious about substituting their own scientific judgement for that of an expert regulator. As such, judicial review is typically deferential where Parliament has entrusted decisions to expert regulators and where statutory tests involve judgment and weighting.

Therefore, a finding that the NZ EPA's decision was lawful is not equivalent to a finding that New Zealand's uses of glyphosate have been comprehensively risk assessed or demonstrated to be safe.

If s 62 operates as the gateway to reassessment, its interpretation matters. Under the protective structure of HSNO it can be understood as a regulatory safety valve: the mechanism through which emerging hazard evidence, changed exposure, cumulative effects or developments in international science can reopen an earlier approval. If the threshold for 'significant new information' becomes too demanding, that safety valve can effectively close before the substantive risk question is examined.

If the Court characterised s 62 as 'highly discretionary and administrative', and therefore accepted a high threshold for 'significant new information', that raises a constitutional question:

- Is s 62 meant to be protective and precautionary?
- Or is it meant to shield prior approvals unless overwhelming evidence emerges?

ELI's point about the absence of any documented prior NZ risk assessment is legally important. If glyphosate has never undergone a full, contemporary, New Zealand-specific reassessment under current knowledge frameworks (mixtures, cumulative exposure, endocrine pathways, ecological systems impacts), then:

- What baseline is s 62 operating against?
- Significant compared to what?

This is particularly problematic where no contemporary New Zealand risk assessment provides a clear evidentiary baseline. A public-law concern arises if significance is assessed principally against conclusions reached by overseas regulators without first determining whether the uses, exposures and controls underpinning those conclusions correspond with those applying in New Zealand.

HSNO is territorially grounded legislation. It requires consideration of New Zealand's environment, exposure patterns, Māori interests, and ecological context.

The Court accepted the NZ EPA's weighing of ELI's material against existing EU regulatory assessments. Weight-of-evidence models are standard in toxicology but establishing weight of evidence before progressing to risk assessment is arguably misleading. Under HSNO officials operate within a statute that explicitly requires that official act to:

- Protect human and environmental health.
- safeguarding life-supporting capacity of environmental systems.
- consider uncertainty and operate with precaution s 7.

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Precaution does not displace the weighing of evidence; it reframes it. It requires officials to ask whether credible scientific uncertainty about potentially serious harm warrants further inquiry, rather than being resolved at the threshold stage.

(e) The significance of the EFSA comparison

Our subsequent examination of the regulatory record identifies a further issue whose significance does not appear to have been squarely addressed. The NZ EPA relied substantially upon contemporary overseas regulatory assessments, particularly EFSA, when concluding that the available weight of evidence did not demonstrate a change in risk sufficient to justify reassessment.[20]

Yet a regulatory conclusion cannot be separated from the representative uses and exposure assumptions against which the risk was assessed.

As we discussed in Chapter [1](d) above, EFSA's assessment became progressively more use-specific: its 2015 review assessed a maximum cumulative application of 4.32 kg active substance/ha/year, while its 2023 assessment generally limited representative agricultural uses to 1.44 kg a.s./ha in a 12-month period, with some assessed scenarios extending to 2.16 kg/ha. The 2023 representative uses included defined terrestrial applications and did not include aerial broadcast application directly onto wetlands, standing water or aquatic vegetation.[21] [22] [23]

New Zealand took a materially different regulatory path. Its historic glyphosate assessment permitted up to 7.56 kg glyphosate acid/ha per application, and levels similar to this remain as a permitted use. [24] [25]

What was not addressed by the NZ EPA when declining the application were differences in representative uses and the relationship with controls. EFSA's quantitative environmental modelling supporting that decision calculated surface-water exposure arising from spray drift and runoff from terrestrial use; it did not separately quantify exposure resulting from intentional direct application to surface water.

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[20] EPA Assessment Report (April 2024) Grounds for reassessment of glyphosate and glyphosate-containing substances APP204718. https://www.epa.govt.nz/assets/FileAPI/hsno-ar/APP204718/APP204718-Grounds-for-Reassessment-EPA-Assessment-report.pdf

[21] EFSA (2009) Submission of scientific peer-reviewed open literature for the approval of pesticide active substances.
[22] EFSA (2015), "Conclusion on the peer review of the pesticide risk assessment of the active substance glyphosate." EFSA Journal 13(11):4302.
[23] EFSA (2023), Peer review of the pesticide risk assessment of the active substance glyphosate. EFSA Journal 21(7):8164.
[24] ERMA (2009) Evaluation and Review Report. Application for Approval to Import or Manufacture GF-1280 for Release, Application Number: ERMA200031
[25] ERMA (December 21, 2009). Decision. To import or manufacture GF-1280 as a herbicide for commercial use for the non-selective control of many annual and perennial grasses and broadleaf weeds in a wide range of situations. Applicant Dow AgroSciences. ERMA200031

New Zealand nevertheless permits glyphosate products to be applied in waterways, including boom or aerial willow treatment, without an identified aquatic-specific quantitative risk assessment or application limit.

This results in inconsistent decision-making. The NZ EPA invoked EFSA as an authoritative source supporting regulatory confidence, while New Zealand diverged from EFSA where the representative uses and controls defining the boundaries of that confidence were concerned. In effect, the overseas conclusion travelled to New Zealand without necessarily bringing with it the exposure envelope within which that conclusion was scientifically established.

This does not demonstrate that the High Court's judgment was legally wrong. Nor does it establish that the Court was asked to determine this precise issue.

However, it raises the question that should be central to future regulatory decision-making: if an overseas assessment is relied upon as evidence that no materially different risk has emerged, must the EPA first establish that New Zealand's authorised uses remain within the conditions actually assessed by that overseas regulator?

For wetlands the problem is sharper still. EFSA's aquatic risk conclusion concerned concentrations predicted to reach surface water from representative terrestrial uses, including pathways such as spray drift. It was not an assessment of intentionally treating the water or wetland itself. Operational controls governing how spraying is performed cannot substitute for the missing risk assessment. They manage the manner of application; they do not establish that an unassessed exposure scenario is environmentally safe.

This also changes how the ‘weight of evidence’ issue should be understood. Weight-of-evidence approaches are legitimate tools in toxicology and regulatory science. The difficulty arises when evidence is weighed at the gateway to reassessment without first asking whether the existing regulatory evidence is applicable to the exposure being authorised.

An extensive European assessment of one set of representative uses cannot, by its sheer evidential weight, answer a different exposure question that was never assessed.

Precaution therefore does not displace the weighing of evidence; it changes the regulatory response to uncertainty. Under HSNO, credible uncertainty about potentially serious harm should be capable of triggering further inquiry, monitoring, additional controls or reassessment rather than being resolved at the threshold stage through reference to overseas regulatory conclusions.

In New Zealand comprehensive pesticide-use data, environmental monitoring and biomonitoring remain limited. In those circumstances, absence of evidence demonstrating changed risk cannot readily be equated with evidence that risk has not changed. Where exposure information is missing, a protective statute may require the regulator to measure and investigate, rather than infer continuing safety from the absence of measurements.

A related problem is the evidentiary hierarchy. The NZ EPA's Methodology (2022) gives substantial weight to guideline-compliant and GLP studies. Such studies have an important regulatory role, but an overly rigid hierarchy can result in epidemiology, mechanistic evidence, systematic reviews and independent synthesis being given less regulatory influence where causal inference is

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complex. Regulatory endpoints can consequently persist for decades even as scientific knowledge and exposure conditions change.

The broader issue is therefore not simply disagreement over glyphosate carcinogenicity. It concerns regulatory stewardship. A protective hazardous-substances regime must continuously connect hazard evidence with actual exposure, representative use, monitoring and controls. “Alignment with overseas regulators” is scientifically meaningful only to the extent that New Zealand also understands where it is aligned, where it has diverged, and what those differences mean for risk.

The resources devoted to the glyphosate Call for Information, the EPA's assessment of ELI's application and subsequent litigation also invite an obvious question. If glyphosate has never undergone a comprehensive contemporary New Zealand risk assessment, at what point does continued defence of the existing regulatory position become less rational than undertaking the assessment needed to establish it?

The post-2015 regulatory history may be better characterised not as a narrow dispute over individual scientific studies, but as evidence of a broader deficit in regulatory stewardship.

The system can process applications, update classifications and refer to overseas regulatory conclusions, while the harder question remains insufficiently addressed: do the uses and exposures actually permitted in New Zealand fall within the scientific boundaries of the risk assessments being relied upon? Where they do not, HSNO's protective and precautionary architecture should require that gap to be identified, investigated and resolved.

In circa 2023-2026 circumstances where there is no routine environmental or biomonitoring data in New Zealand, no documented contemporary NZ-specific risk assessment, and where European Union recommendations and controls, including formulation strengths, public-use restrictions, and application rules on water surfaces differ materially from domestic settings, the evidential context is not equivalent.

A weight-of-evidence approach applied without this contextual overlay can operate less as evaluation and more as a barrier to regulatory inquiry, effectively raising the gate that s 62 was designed to open.

The case of glyphosate and the calls for a formal risk assessment therefore represent something more fundamental than disagreement about carcinogenicity. They are a request that HSNO’s protective architecture be used as designed: not merely to catalogue hazards, but to assess risk in real-world NZ contexts, including vulnerable populations, cumulative/aggregate exposures, and formulation-level effects.

A central feature of this legacy approach is the evidentiary hierarchy. The NZ EPA’s approach, observed in the Methodology (2022) privileges GLP/test-guideline studies and uses reliability scoring that tends to down-weight epidemiology (as Professor Dave McLean has described), systematic reviews, and independent synthesis, especially where causal inference is complex or mechanisms are contested.

However, studies can get 'locked in' and form the basis of acceptable exposure levels for decades. Old unpublished Monsanto studies (Bio/Dynamics 1981; Atkinson 1993) form the basis for evidence for safe levels of glyphosate in drinking water in 2026.

The position of current NZ EPA management may be defensible as one method of managing uncertainty, but it also entrenches a predictable asymmetry: industry-commissioned dossiers and regulator-to-regulator review loops become the 'gold standard', while independent science is treated as suggestive but rarely decisive. In practice, has enabled the claim of 'alignment with overseas regulators' to substitute for an any domestic evaluation of New Zealand exposures and any discussion of alternatives that could be safer. This is not protective of farmers and growers and their families, but protective of the chemical industry.

ELI's appeal concerned an argument about statutory interpretation and governance design: whether a protective statute that embeds precaution can be administered through a gateway so strict that precaution is functionally postponed until evidence becomes both overwhelming and regulator-conforming. In other words, the question is whether precaution is an operative decision principle or a recital that has little traction until the door to reassessment is already open.

HSNO's protective framework requires attention to both hazard and risk and instructs caution where uncertainty exists. The governance tension is that 'hazard' can be acknowledged yet neutralised by insisting that risk has not been shown to change, without doing the exposure work that would actually reveal whether risk has shifted under NZ use patterns.

If NZ exposure data are thin, and it is [26] [27], that does not necessarily justify regulatory confidence; it may justify a precautionary programme of measurement, monitoring, and targeted control. A regime that treats data absence as reason to maintain status quo, rather than reason to investigate, can drift away from HSNO's protective logic.

It's interesting to observe that the NZ EPA have been happy to spend budgetary resources on the Call for Information (which involved analysing 465 responses and editing and publishing a 129-page Summary Report), on the 26-page rebuttal to ELI and to ongoing court litigation – but not on formal risk assessment of a pesticide that has never been formally risk assessed in 50 years.

Taken together, the post-2015 story reads less like a science dispute and more like a stewardship deficit. The system appears capable of processing paperwork, aligning classifications, and restating alignment with overseas regulators, yet reluctant to undertake a transparent, NZ-specific risk assessment that integrates modern evidence, exposure realities, formulation effects, and uncertainty. The ethical critique is that where a substance is ubiquitous and exposures are widespread, 'procedurally correct' governance is not necessarily 'substantively responsible' governance.

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[26] Parliamentary Commissioner for the Environment (2022, March) Knowing what's out there: Regulating the environmental fate of chemicals. Wellington: Parliamentary Commissioner for the Environment.
[27] Parliamentary Commissioner for the Environment (July 2026). Unlocking New Zealand's Environmental information. ISBN 978-0-473-79655-6 (online)

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[11] REGULATORY GATEKEEPING OR A BROADER STEWARDSHIP FAILURE?

Regulatory guidelines can become a gatekeeping technology, useful for consistency, but also capable of excluding mechanistic, epidemiological, and real-world field evidence that signals harms outside standard endpoints.

As this briefing paper has discussed, the dominant public-facing paper, a *Methodology* (2022) is essentially an applicant-facing, model-centric, often out-dated construction, and does not embed circa 2026 evidence-based pathways for independent evidence synthesis, monitoring integration, or operational precaution.

Without published decision pathways, officials predictably default to what they can defend procedurally (models, defaults, dossiers), rather than a stronger and scientifically robust evidence base, which is what HSNO requires substantively. This includes knowledge of hazard and risk under New Zealand conditions, with precaution where uncertainty is material.

This reflects the concept of regulatory capture.

Appropriate HSNO Act stewardship can only work if officials have the resourcing and capacity to broaden their scope to include new information and new evidence of risk.

When credible signals exist, for example, including mechanistic plausibility, cohort signals, developmental windows, class-based effects, non-EATS endocrine pathways, the agency must be required, by internal policy, to conduct or commission systematic reviews and integrate monitoring evidence, rather than leaving it to chance or submissions.

Modern AI and machine learning tools support regulatory monitoring, research synthesis and data analysis.

They can reduce the marginal cost of horizon scanning, evidence mapping, adverse outcome pathway (AOP) synthesis, and cross-linking monitoring detections to plausible mechanistic harms, which can then support scientific and official judgement.

CONCLUSION

The NZ EPA has a missing white paper problem and a formal risk-assessment avoidance problem. As this brief paper outlines, there is a lack of evidentiary documentation to demonstrate that NZ EPA officials are supported in their scientific analysis and decision-making processes, which ensure there is transparency in the use of science to justify the regulation of hazardous substances and the quality of the scientific understanding that is relied upon.

There is no consolidated, HSNO-facing decision framework explaining how officials should approach risk assessment and precaution in the 2026 context of mixtures, long latency, endocrine modalities, NZ exposure heterogeneity and incomplete monitoring.

If the new CEO continues on the path that the current CEO has followed, the NZ EPA will be faced with an accelerated decline in trust, simply because new technologies have transformatively

enhanced the capacity for both scientists and lay communities to build a deeper understanding of hazards and risks from hazardous substances, and communicate this information in a public-good capacity.

The above discussion provides a credible case for an independent inquiry into the ability of the EPA to safely steward hazardous substances, however, with a new CEO starting mid-year, there is a huge opportunity for reform that can be led within the agency itself.

The next five years will demonstrate whether the new CEO has the fortitude to undertake this work.

Kiwis will keep a keen eye on the unfolding operations and the work of members of Parliament, Treasury and related health, environment and agricultural ministers in ensuring that the NZ EPA has adequate long-term resourcing, and is not a timid lap-dog of the chemical industry, but a globally relevant regulator which has the capacity to undertake its work to a level of quality that ensures that it can fulfill the purpose of the HSNO Act.

In the meantime, many of the reasons why an inquiry is presently needed, are listed above.

All Kiwis can start asking questions that could be answered by future investigators. Is the NZ EPA sufficiently resourced to:

- Independently review contemporary scientific literature to understand new knowledge around the mechanism and action, the risk of bioaccumulation, and the problem of persistence (including chronic exposures) in human biology and the environment.
- Demand and then evaluate and incorporate New Zealand-specific environmental monitoring and exposure data in its considerations. This includes urban, worker, bystander and neighbouring property exposure, including from formulation and mixture effects.
- Assess persistence, bioaccumulation, and long-term environmental loading;
- Evaluate formulation toxicity and mixture effects; and
- Manage uncertainty in a manner consistent with HSNO's precautionary intent.

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