



Established 1968

New Zealand Freshwater Sciences Society

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Ministry for Primary Industries
Spatial, Forestry and Land Management
PO Box 2526
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Dear Minister Smith and Associate Minister Goodhew,

FEEDBACK ON THE PROPOSED NATIONAL ENVIRONMENTAL STANDARD FOR PLANTATION FORESTRY

Introduction

1. The New Zealand Freshwater Sciences Society (“NZFSS”) was established in 1968 as the New Zealand Limnological Society. It is a constituent body of the Royal Society of New Zealand and has some 430 members. The Society’s membership spans the breadth of academics and researchers to resource managers in the field of freshwater. NZFSS is the key professional society for practitioners in freshwater science and management in New Zealand. The Society aims to “establish effective liaison between all persons interested in any aspect of fresh or brackish water research in New Zealand, and to encourage and promote these interests”.
2. The NZFSS welcomes the opportunity to comment on the proposed National Environmental Standard for Plantation Forestry (“NES”), which outlines changes to how plantation forestry activities are managed under the Resource Management Act 1991 (“RMA” or “the Act”).
3. The NZFSS is concerned about the widespread decline in aquatic biodiversity and water quality in New Zealand¹. A large proportion of the Society’s membership is directly involved in resource management as experts at the local government, Environment Court and central government levels and a number of members are accredited as independent hearings commissioners through the ‘Making Good Decisions’ programme. These members have a

¹ <http://freshwater.science.org.nz/index.php/news/media-statement-nzfss-key-closing-messages/>

wealth of science and resource management expertise to contribute to freshwater management processes such as the NES.

4. The Society understands that the basis for the proposed NES is to address “unwarranted variation” between approaches taken by Councils in their planning, so as to provide a nationally consistent approach to resource planning as it relates to plantation forestry, which at the same time is responsive to local environments.
5. We further understand that the NES (as provided for under sections 43–44A of the RMA) would establish a technical standard for forestry activities and set out when an activity is permitted and when consent is required. An NES would override rules for plantation forestry in planning documents, except in relation to matters where local authorities are allowed to be more stringent than the NES.
6. The NZFSS have provided feedback on the following matters:
 - a. Objectives of the NES
 - b. Principles underpinning the NES
 - c. Local Council burden to monitor permitted activities
 - d. Fish spawning and native fish provisions throughout the NES
 - e. Sediment effects on aquatic ecosystems
 - f. General comments on the proposed NES
 - g. Proposed rules and permitted activity controls
 - h. Other controls
 - i. General conditions
 - j. Errors

Objectives of the NES

7. Section 2.3 outlines the objectives of the proposed NES as aiming to:
 - a. remove unwarranted variation between Councils’ planning controls for plantation forestry;
 - b. improve certainty of RMA processes and outcomes for plantation forestry stakeholders, while maintaining consistency with the purpose of the RMA;
 - c. improve certainty about environmental outcomes from plantation forestry activities for forestry stakeholders, including communities, nationally;
 - d. contribute to the cost-effectiveness of the resource management system by providing appropriate and fit-for-purpose planning rules to manage the effects of plantation forestry.

8. The Society **conditionally supports** the objectives of the proposed NES only if an additional objective is included to ensure “cumulative adverse effects of production forestry activities on water and aquatic ecosystems are avoided, remedied or mitigated” or similar wording and intent. This will ensure that the anticipated environment outcomes of the NES are included within the framework of objectives that can be monitored and will need to be measured and reported on by MPI as the lead agency for implementation. An improvement focussed objective, rather than one which seeks to improve “certainty” of outcome will better achieve the purpose of sustainable management in the Act.

Principles underpinning the proposed NES²

A generally permitted activity regime

9. Section 43A (3) of the RMA means that the NES cannot allow as permitted any activity that has significant adverse effects on the environment unless a resource consent is issued. The meaning of effect in section 3 of the RMA applies here and includes cumulative adverse effects within the definition.
10. Permitted activity discharges to water (or to land where they may reach water) for example discharges of sediment, are governed by s70 of the RMA (1991). Section 70 (1g) requires Regional Councils to be satisfied that the discharge will not result in significant adverse effects on aquatic life. The generally permissive nature of the proposed NES means that any discharges need to meet this threshold test to a satisfactory level if they are to remain permitted activities. As written, the rules in the NES do not meet this threshold.
11. It appears that the focus of applying permitted activity status has taken precedence over the other principles. In particular, restrictions on matters where Councils are able to apply more stringent rules, along with restrictive conditions on matters that Councils are able to consider in the situations where consents are required. The way these are worded within the NES requires clarification, the current wording, appears to impede the ability of Councils to be responsive to local environments.

The assumption that the level of control should be related to effect “at the location of the activity”

12. Controlling activities for their effects only at the location of the activity does not meet the RMA meaning of “effect”, specifically section 3 (d) which relates to cumulative adverse effects. Often these are the type of effects that Councils are trying to control or avoid as a result of forestry activities, particularly in relation to cumulative sediment discharge, native fish community health and erosion effects on a whole-of-catchment basis, including effects extending into Coastal Environment. Regulatory control based only on effects ‘at the site’ does not meet the RMA meaning of effect and will not enable effective catchment management of cumulative effects resulting from production forestry activities.

² Page 8 of the NES discussion document

Understanding of the risk of adverse effects nation-wide

13. The Society **supports** the principle of evidence-based scientific understanding of effects. With respect to this point the Society directs the Ministers to consider the effects of sedimentation and other adverse effects related to forestry activities on **resident and migrating** native fish populations, not just during spawning but prior to spawning and throughout the life-cycle of all relevant species.

Nationally consistent yet responsive to local environments

14. The Society **supports** a nationally consistent approach that is also responsive to local environments. A number of changes are required to enable this responsiveness at the local level. Currently the NES appears to hamper Councils in setting more stringent rules (or utilising already operative rules in plans for these purposes) by requiring a Schedule 1 Plan Change process. Clarification of the role of operative rules for significant habitats and fauna in relation to setting more stringent rules under the NES is needed. Will a Plan Change be necessary to reinstate rules for this purpose?
15. The NES allows for more stringent rules to be applied in order to meet catchment-wide water quality effects that are linked to the objectives of the NPS-FM. However, to apply these more stringent rules Councils will need to undertake a Schedule 1 plan change process with the associated risks and costs of re-litigating ground that has already been covered by existing resource management issues or in relation to future implementation of the NPS-FM. There are currently no attributes associated with sediment or native fish in the National Objectives Framework of the NPS-FM so the linkage and impetus for setting more stringent rules remains uncertain, i.e. it remains uncertain whether the NOF will fill any gaps left by the NES.
16. Restricting Councils in this way implies that all possible situations and outcomes have been considered in drafting the NES. This is unlikely, given that our scientific understanding is constantly changing, alongside rapid technological changes and changes in practice within the forestry industry. Furthermore, climate change is likely to produce large changes in local environmental conditions (e.g. through sea-level rise, changes to rainfall rates and the probability of wind-throw events) over the timescale of forestry crop rotations. In light of these points, we consider there ought to be greater discretion for Councils to adapt the rules to changing local conditions and information in an effective and efficient manner.
17. The Society considers that a more reasonable approach would be to specify consistent 'bottom line' standards and conditions at a national level that are directly related to the effects and allow Councils greater scope to adapt these to take account of local conditions, community interests and desires and changing conditions over time.

Local Council burden to monitor permitted activities

18. In order to ensure permitted activities do not cause significant adverse effects on the environment they must be monitored and enforced³. Shifting activities to a permitted status wholesale will require a large monitoring burden to fall to local authorities that may have been met by foresters under former plan rules. Costs and capacity for Councils to undertake this monitoring burden must be accounted for. Factored into cost considerations is the potential loss of capacity and resources from other monitoring areas in order to ensure the NES is adequately monitored and enforced.
19. The forest industry should assist in funding and capacity for monitoring and continued research on effects, including the ongoing effects arising from the implementation of the NES this will allow the costs to fall with those who gain the most benefit from the regulation.
20. The Society **requests** the Ministers provide a mechanism for Councils to recover costs from forestry owners for monitoring and auditing associated with forestry activities within their regions.

Fish spawning and native fish provisions throughout the NES

21. Nationally, 78% of native freshwater fish have an assigned conservation threat status. This is an increase from the last reported threat classification for native fish in 2009 where 67% were identified as threatened or at risk⁴ and the 2005 classification which described 53% as threatened or at risk⁵. Increases in the proportion of threatened or at risk species has resulted from a combination of changes in taxonomic resolution for some species, changes in threat classification method between the 2007 and 2010 classifications, and wide-spread continued national decline in native fish populations. The majority of threatened taxa classified as threatened or at risk in 2009 and 2013 belong to the *Galaxias* genus and all species from the *Neochanna* (mudfish) genus are ranked as threatened or at risk. Many of these species are not identified as having significant conservation status in the NES.
22. We query why only 21 of the 41 species assessed in the NIWA report are included in the NES. We also note that the NIWA report does not include a range of recognised but not formally described fish species, so the NES currently considers a small subset of all fish species and many threatened species are omitted.
23. The peak spawning periods listed in the table in the draft rules on page 84 are inconsistent with those stipulated in the NIWA technical report⁶ on which they were supposedly based. For

³ This is the key drawback of a permitted regime - compliance, monitoring and enforcement are uncertain.

⁴ Allibone R, David B, Hitchmough R, Jellyman D, Ling N, Ravenscroft P, Waters J, 2010. Conservation status of New Zealand freshwater fish, 2009. *New Zealand Journal of Marine and Freshwater Research* 44:4, 271-287.

⁵ Hitchmough R, Bull L, Cromarty P, (comps) 2007: New Zealand Threat Classification System lists—2005. Department of Conservation, Wellington. 194 p.

⁶ Smith J 2014. Freshwater Fish Spawning and Migration Periods. MPI Technical Paper No. 2015/7. Prepared for Ministry for Primary Industries (November 2014). NIWA Client Report No. HAM2014-101. 84p.

example, rainbow trout peak spawning period is shown as 1 April to 31 May c.f. 1 June to 31 August in the NIWA report, the same period (1 September to 31 October) is specified for all non-migratory galaxiids listed as well as for redfin bully, whereas the NIWA report lists no peak period for any of these species. Spawning range varies between species from 1 June to 31 September for bignose galaxias to 1 August to 31 December for lowland longjaw galaxias.

The precise nature of the periods listed in the spawning table implies that they are based on highly precise scientific knowledge. However, the NIWA report clearly states that “the calendars are intended as a general guide and are no substitute for in-depth studies of specific sites”. Furthermore, this report recognises that there is likely to be regional variation in spawning associated with environmental conditions and that there is little or unreliable information available for some species.

24. As the spawning information only draws on a few relevant studies, important information is lacking. The NES does not recognise regional variation in spawning timings even when the NIWA report notes this as an issue. It is well known that spawning timing differs with latitude and altitude. Furthermore, for migratory species that regularly landlock (e.g., kōaro) spawning timing in lake populations can differ substantially from the marine migratory populations. This is especially important when considering forestry activity in the central North Island and catchments upstream of lakes in the South Island.
25. For instance Gollum galaxias, Central Otago roundhead and Taieri flathead are all known to start spawning in August. However, Taieri flatheads in high altitude streams (some of which are subject plantation forestry activities) do not begin to spawn until November. The Society **requests** that the NES is amended to include spawning timings that are extended to encompass the full duration of spawning season nationally or rules that reflect the spawning activity in local streams.
26. Shortjaw kōkopu is not included in the table in the draft rules, despite having a higher threat classification and predicted ‘combined forestry effects ranking’ than several species that have been included. Īnanga is omitted for the rules and this species forms the mainstay of the whitebait fishery. Recent concern of the decline of this species reflects a decline in riparian spawning habitat quality.
27. In the interests of consistency, given their threat status, Tarndale bully, lamprey and Northland mudfish should arguably also be included in the table, notwithstanding their relatively low predicted ‘combined forestry effects ranking’, given that Stokell’s smelt is included in the table.
28. As previously noted the spawning periods also only cater for periods of spawning activity and not for the egg development periods which is especially important for the salmonid species where egg development can take several months.
29. It appears as though the Fish Spawning Indicator has not considered fish migration. Fish species have varied responses to turbidity with some avoiding turbid rivers when migrating upstream (see cited references in paragraph 21 above).
30. We have also found that the predictive model makes incorrect predictions of the fish present at sites. The model was constructed without knowledge of fish passage barriers so does not recognise impediments to upstream passage such as dams and waterfalls. It also uses the

River Ecosystem Classification (REC) reaches as its base unit and ignores survey data from adjacent reaches. In our review of the predictions we found numerous examples of brown trout being predicted as present when they are absent and many threatened galaxiid populations not predicted as present when they are. Also, the GIS tool for the NES does not map all streams. There appeared to be areas where no streams were made by the GIS tool. Therefore, the predictive modelling in its current state does not provide a high degree of reliability. Survey data on critically threatened species appears to have been omitted both from the NZFFD data used and the predictive modelling. This means the current data and model used for the GIS associated with the NES does not identify significant habitats for native fish whether this is adult or spawning habitat.

31. Given these limitations in the fish distributions and spawning assessment we would like the distributional data reviewed and updated to ensure that threatened taxa are accurately represented in the NES or that Regional Councils that have more accurate fisheries data can set local rules that reflect the actual fish species present.
32. Furthermore, the General Conditions of the NES do not provide adequately for protection of resident fish, particularly non-migratory galaxiids with high conservation threat status (e.g. the following galaxiids, Eldon's, dusky, Gollum, Clutha flathead, Teviot flathead, Taieri flathead, lowland longjaw, upland longjaw, bignose, southern flathead, northern flathead, Canterbury, dwarf and round head galaxias). These fish spend all of their lives in rivers or streams, and adverse impacts from forestry related activities present a significant risk to juveniles, adults, their habitat, and lifecycle (beyond the spawning season). This also applies to migratory species, such as three kōkopu species and kōaro that migrate to sea for a short period as juveniles, but spend most of their lives in rivers and streams. Protection should be extended to their adult habitat (and the habitat of their invertebrate food sources, i.e. rivers and streams) outside of spawning seasons.
33. A number of the galaxiids, including the three kōkopu species, kōaro, īnanga, dusky and Eldon's galaxias, spawn in the riparian margin that they access during flood events or high tides. The vegetation cover is critical for these spawning areas as it provides shade, leaf litter and root mats that maintain a humid environment that prevents egg desiccation. Damage to the riparian vegetation outside the spawning season can remove shade, root mats and leaf litter. This vegetation can take months or years to recover from such damage and therefore spawning is compromised for extended periods. This issue applies to streams of all sizes as the species listed above utilise streams as small as 0.3 m wide so protection of the riparian vegetation is required year round for small and large stream occupied by these species.
34. The Society **requests** that effects on spawning within riparian margins are clearly acknowledged within the NES. For example: "If not carefully managed, some forestry activities can affect the spawning habitats of freshwater fish in freshwater and riparian zones. As a number of native fish including whitebait species and threatened species spawn amongst vegetation on the riparian margin".
35. The rules limit the vehicle crossing to 20 axle movements per day. The appropriateness of this will depend on the sensitivity of the receiving environment and the nature of the crossing. We do not know if the 20 axle movements a day is sufficient to protect vulnerable habitat. We also

note the NES does not limit the number of crossing points. Therefore, it is possible to construct an unlimited number of crossings on streams.

36. Hauling partially suspended logs across small streams < 3 m is likely to do significant damage to the stream. Small streams are less able to flush sediment that accumulates on their beds as a result of stream bank damage and the propose log hauling rule is expected to cause significant damage to small streams.
37. We recognise that protection of small streams < 3 m wide may appear problematic for foresters as it may limit the available planting area and harvesting options. However, many of the small stream specialists are rare and therefore not found in many streams. For instance, Eldon's and dusky galaxias occupy less than 30 streams each and are restricted to just a small area of Otago. Therefore, while protection will inconvenience some forestry activities this will be limited in its geographic range.
38. The NES should allow Councils to identify sites of significance for fish in their regions (including small and intermittent streams) and to apply more stringent regulations in relation to activities in the beds and riparian margins of rivers and streams to protect both fish habitat and their lifecycles, beyond just the peak spawning period.
39. We **request** that the table in the draft conditions be updated to ensure consistency with scientific advice cited and additional data on fish spawning that is available, add all threatened taxa⁷ and allow Councils to identify regionally specific fish species, sensitive spawning periods and locations based on local knowledge and information. Extend the spawning periods covered to take account of uncertainty in the science and regional variation.

Sediment effects on aquatic ecosystems

40. Sedimentation associated with forestry activities can have very significant impacts on freshwater quality and ecosystem health. Suspended sediment directly smothers the feeding and gill structures of invertebrates and gills of fish and is known to reduce fish diversity⁸ and cause avoidance behaviour in a number of native fish species, including juvenile banded

⁷ Bowie, S., Pham, L., Dunn, N., Allibone, R. M., Crow, S. K. (eds). (2014). Freshwater fish taxonomic workshop: Focussing on New Zealand non-migratory galaxiid issues: Department of Conservation.

⁸ Richardson J, Jowett IG 2002. Effects of sediment on fish communities in East Cape streams, North Island, New Zealand. *New Zealand Journal of Marine and Freshwater Research* 36: 431–442.

kōkopu⁹. Suspended sediment also reduces the ability of fish to feed¹⁰ and disrupts the natural primary productivity base of the food chain in both freshwater and estuarine ecosystems¹¹.

41. Deposited sediment directly affects aquatic life by increasing invertebrate drift out of affected habitat¹²; reduces interstitial spaces, spawning habitat and refugia for aquatic invertebrates and fish¹³; enables the establishment of aquatic weeds, alters bed habitat and can create anoxic conditions. In severe cases estuarine sedimentation contributes to anoxia and mortality of estuarine fauna¹⁴.
42. The effects of forestry on stream environments are well-documented in New Zealand¹⁵ and identify vegetation clearance and roading and tracking as the greatest generators of sediment during forest establishment. Roding, log landings and mass movement from harvested slopes are the key contributors once harvest has commenced. Between establishment and harvest, roading and tracking continue to contribute surface eroded sediment. Effects on water clarity generally last from harvest until re-establishment of groundcover.

General comments on the content of the proposed NES document

44. Section 1.1 Central government regulation of activities with potential for extensive adverse effects must be developed and presented in an objective, evidence-based and unbiased manner. The wording of section 1 of the document is biased towards the forestry industry and may not be perceived as objective regulation.

⁹ Rowe D, Hicks M, Richardson J 2000. Reduced abundance of banded kokopu (*Galaxias fasciatus*) and other native fish in turbid rivers of the North Island of New Zealand. *New Zealand Journal of Marine and Freshwater Research* 34: 547-558.

Richardson J, Rowe DK, Smith JP 2001. Effects of turbidity on the migration of juvenile banded kokopu (*Galaxias fasciatus*) in a natural stream. *New Zealand Journal of Marine and Freshwater Research* 35: 191-196.

¹⁰ Rowe DK, Dean TL 1998. Effects of turbidity on the feeding ability of the juvenile migrant stage of six New Zealand freshwater fish species. *New Zealand Journal of Marine and Freshwater Research* 32: 21–29.

¹¹ Rafaelli DG, Raven JA, Poole LJ 1998. Ecological impact of green macroalgal blooms. *Oceanography Marine Biology Annual Review* 36:97–125.

¹² Suren AM, Jowett IG 2001. Effects of deposited sediment on invertebrate drift: an experimental study. *New Zealand Journal of Marine and Freshwater Research* 35: 725-737.

¹³ Clapcott JE, Young RG, Harding JS, Matthaei CD, Quinn JM, Death RG 2011. Sediment Assessment Methods: Protocols and guidelines for assessing the effects of deposited fine sediment on in-stream values. Cawthron Institute, Nelson, New Zealand.

¹⁴ Robertson BM, Stevens LM 2007. New River Estuary 2007 Broad Scale Habitat Mapping and Sedimentation Rate. Report prepared by Wriggle Coastal Management for Environment Southland. 34p.

Robertson BM, Stevens LM 2011. New River Estuary 2010/11 Synoptic Survey of Waihopai Arm Sediments. Report prepared by Wriggle Coastal Management for Environment Southland.

¹⁵ Fahey B, Duncan, M, Quinn J 2004. Impacts of Forestry. In: Harding J, Mosely P, Pearson C, Sorrell B (Eds) *Freshwaters of New Zealand*. NZ Hydrological Society and NZ Limnological Society. Caxton Press, Christchurch, New Zealand.

Harding J, Quinn J, Hickey C 2000. Effects of mining and production forestry. In: Collier KJ and Winterbourn MJ (Eds) *New Zealand Stream Invertebrates Ecology and Implications for Management*. NZ Limnological Society, Caxton Press, Christchurch, New Zealand.

45. Section 2.2 The statement: “Generally, adverse environmental effects are well managed as a result of good practice within the industry and existing plan rules.” Is unsubstantiated. Adverse effects of Forestry activities are well known in many areas of New Zealand. There is no evidential basis for the assumption that existing plan rules of good practice are achieving better management of effects.
46. Section 2 lacks an acknowledgement of downstream impacts of forestry and long term impacts on soil structure and fertility. These issues should be acknowledged and included.
47. Table 2: The effects of Afforestation on water yield can be significant. New Zealand has large areas of land that are susceptible to droughts and given that the predicted effects of climate change will exacerbate these effects in many regions, we suggest that serious thought be given to rules around afforestation and maximum tree densities in dry areas. Regional and District Councils probably need some national guidance on this matter and the NES could usefully provide that.
48. Section 3.1 Developing draft rules the Society **supports** the following statement: “The proposed rules and the threshold at which consent is required should be based on up-to date science”. However, we note that it is important to recognise that the information on spawning, migration and fish presence (recorded and/or predicted) is based on existing information, and in several cases the NIWA technical report states that expert opinion was applied, given the limited information available, although considerable expert knowledge was still not included. There needs to be a clear mechanism for advances in available science and information to update the provisions and rules in the NES as it comes to hand (for example: updated information on species distribution, spawning habitat and timing, conservation status).
49. This also applies to the conservation threat status of native fish, which is updated periodically. There needs to be provision for these updates to be incorporated into the NES as they become available (the same point also applies for bird nesting times on the preceding page of the draft rules).
50. Section 3.4 and Table 4 defines where Councils will be able to apply rules more stringent than the NES. The Society **supports** provisions to be more stringent in the Coastal Marine Area, geothermal and karst areas, places of known cultural or heritage values, significant natural areas and outstanding natural features and landscapes, shallow aquifers and where required to meet the objectives of the NPS-FM. However, given the tenuous linkages between the rules of the NES and the NPS-FM, we feel that other receiving waters should be included with the provision made for the Coastal Marine Area. For example, the protection of water quality and quantity flowing into lakes, wetlands and rivers may also require more stringent rules for forestry activities than those provided in the NES.
51. The Society would **support** the inclusion in Table 4 of provisions for Councils to have more stringent rules in relation to a range of freshwater receiving waters (not just the Coastal Marine Area).
52. Table 4: Include another “matter” which allows Councils to use more stringent rules when it is deemed that the rules of the NES are not stringent enough to protect the environment in a particular region. For example, the Erosion Susceptibility Classification (“ECS”), fish spawning

and wilding provisions in the NES have been developed as national tools, but they may not be accurate enough in some regions. Therefore, Councils should be allowed to implement more stringent rules if it is deemed that the NES rules don't adequately protect environmental values in a particular region. This is particularly relevant for Councils that have already identified waterbody values through regional planning processes.

53. The society **does not support** the use of the term “Areas of *mapped* significant indigenous vegetation, significant habitats or indigenous fauna...”. It is problematic to require that all areas are “mapped”, particularly in relation to significant habitats for native fish. A more useful term would be “identified” rather than “mapped”, which would allow for Councils to identify criteria for significance in plans without necessarily mapping all sites. Many Councils have not undertaken the exercise of mapping of fish habitat. Mapping of fish habitat is also problematic because the distribution, diversity and abundance of native fish communities is heavily influenced by factors such as distance from the sea, altitude, presence of barriers to migration, and the mobile nature of many native fish. Difficulties are exacerbated by incomplete or non-existent information on the state of aquatic habitats regionally and nationally.
54. In many cases, the recorded presence of fish species is the only or best indicator for whether a site, reach, wetland or lake is a significant habitat. The main disadvantages to using a species-based approach to determine significance are: not all waterways can be sampled and areas of high significance may be missed; sampling is biased towards accessible sites and sites that are more likely to contain native fish; presence of fish during surveys may be affected by season or life-cycle stage; fish that are sampled may be ‘on the move’ between critical or significant habitats; and the presence of fish does not necessarily indicate health of the population or recruitment success over time due to source and sink effects or Allee population effects¹⁶.
55. A predictive modelling approach has been used in conjunction with NZ Freshwater Fish Database records, however the model is only used to assess risks to spawning of a limited number of species and is of limited value in identifying significant habitats of native fish. Currently we are aware that many fish survey results are not submitted to the NZFFD so restricting the NES to using this data is omitting a large pool of data.
56. Additionally, requiring Councils that have identified significant habitats for native fish to apply more stringent rules through a plan change Schedule 1 process (where these rules may already exist within the plan) will allow re-litigation of methods, at significant costs and resources for all parties, to address protection of significant habitats that are already in plans as part of meeting Councils obligations to recognise and provide for section 6(c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna. Where these methods already exists in plans and where it is possible within the constraints of section 33 of the Act and the criteria of the NES are met, more stringent rules should remain operative and not require an additional Schedule 1 process via plan change.

¹⁶ Allee effects are broadly defined as a decline in individual fitness at low population size or density that can result in critical thresholds below which populations crash to extinction.

57. Provision to allow Councils to apply more stringent rules in the CMA should be flexible enough to be able to be applied to Inanga spawning habitat, on margins of estuaries and coastal streams without requiring a Schedule 1 plan change process.
59. Section 3.5 Applying the rules. Three environmental risk assessment tools are proposed for us in determining the level of risk and therefore whether an activity is permitted or not. They cover erosion susceptibility, wildling spread and fish spawning and migration. The Society advises that the environmental effects of production forestry are more wide-reaching than this, for example water yield and nutrient cycling. The Society **does not support** the exclusion of water yield from the scope of the NES. As well as impacts on water supply, hydrological alteration due to afforestation also has the potential to impact on mudfish habitat (as discussed in the NIWA technical report). It also has the potential to impact instream habitat for fish and their invertebrate food supplies.
60. Section 3.5.2 Fish spawning calculator. It is unclear why only 21 of the 41 species assessed in the NIWA report are included in the NES and why migration and resident fish were excluded from consideration. The society requests these issues are addressed throughout the document. Additionally, while it is useful to focus management on sensitive periods, the knowledge of spawning timing and migration is limited for many species. The Society prefers an evidence-based approach along multiple lines of science and research, which could usefully include a habitat susceptibility assessment as well.

Accuracy of the Erosion Susceptibility Classification system

61. The Erosion Susceptibility Classification (ESC) system is critical to interpretation of the NES conditions. The ESC is used as the key reference to define the activity status of most forestry activities, notwithstanding the fact that all listed activities are permitted with conditions, aside from four activities¹⁷ in very high ESC zones and one activity (earthworks) in high ESC zones where the slope is greater than 25°.
62. Deriving an accurate classification of erosion susceptibility over the majority of such a geologically and geographically diverse country as New Zealand is undoubtedly a difficult task. Unfortunately, (but not surprisingly) the ESC is not perfect, and local scale 'ground-truthing' should be allowed for within the NES.
63. For example, in the Maitai catchment in Nelson, one tributary (Sharlands Creek, which is sourced from a catchment predominately under plantation forestry) has been repeatedly identified in scientific and monitoring reports as being a major source of sediment inputs to the lower river¹⁸. A recent report to Nelson City Council¹⁹ stated that of the exotic forestry in the Maitai catchment "*over 68% is on argillite or greywacke hill country and nearly 32% on ancient volcanics. The ancient volcanics are generally located in the lower reaches of the Maitai (i.e.*

¹⁷ Afforestation, earthworks, quarrying, and harvesting.

¹⁸ e.g., Hicks M, Hoyle J 2015. Maitai River Gravel Management Study. Prepared for Nelson City Council NIWA Client Report No. CHC2015-053, 63p; Allen C, Holmes R, Shearer K 2013. The Impact of the Maitai Dam on River Health Relative to Other Catchment Pressures: A Review. Prepared for Nelson City Council. Cawthron Report No. 2371. 30 p. plus appendices. ; Crowe A, Hayes J, Stark J, Strickland R, Hewitt T, Kemp C 2004. The Current State of the Maitai River: a Review of Existing Information. Prepared for Nelson City Council. Cawthron Report No. 857. 146p. plus appendices.

¹⁹ LandVision Ltd. And Moore & Associates. 2014. Review of forestry, Nelson City Council. Draft report prepared for NCC. 24p.

around Sharlands Hill and up the western side of Sharlands Creek) and observations show that it produces a lot more clay or finer material compared with soils developed on argillite or greywacke”.

64. However, the difference in erosion susceptibility within this catchment is not reflected in the ESC, which classifies the vast majority of the Maitai catchment in the yellow/moderate ESC zone. The Society **requests** Councils are allowed the flexibility to apply more stringent rules in relation to local conditions.
65. The Society are also concerned that the ESC is a tool developed specifically for pasture, not forestry. We don't believe that the erosion risks represented by “pasture” reflects accurately the risks represented by “forestry”. The erosion risks of these two activities are quite different in terms of their nature, timing and intensity. To make the rules of the NES more robust, we would like the ESC to be recalibrated to specifically assess the risk of erosion due to forestry activities. We also believe it needs to account for regional differences in climate, geology, soils and the type of forestry undertaken.
66. The ESC, as used in the NES, was “updated”, to make it less conservative, by ignoring sub-dominant erosion risks in Land Use Capability Classes (“LUCs”) where more than one erosion risk was identified. This means the ESC is overly permissive, by ignoring potential significant erosion risks within some LUCs. This opens up significant potential for substantial environmental effects to occur because small areas of erosion can create large environmental impacts. We feel strongly that the original conservative approach of the ESC was more appropriate for environmental protection and we would **support** the NES if the **original ESC approach** were used.
67. Figure 1: The threshold of 25° under the orange classification seems high and has not been justified. Clear-felling on land this steep should not be permitted in order to conserve soil and reduce erosion. As an example to assist policy makers in understanding how steep a 25° slope is, Baldwin Street, New Zealand's steepest street, has a slope of 19°.
68. Section 7.3 details the timeframes for implementation. This section states that Councils will be responsible for gathering data for MPI so that an assessment of effectiveness can be made against the objectives of the NES. Monitoring against objectives requires consideration of performance measures and monitoring programmes prior to setting objectives and implementing the NES. MPI should be considering what environmental performance measures can be monitored at the national level to validate assumptions that the NES will result in more certain and positive environmental outcomes.
69. The Society advises MPI that there are two areas important to monitoring effectiveness to deliver outcomes in the freshwater environment: 1) native fish, and 2) sedimentation. Consideration for monitoring environmental outcomes in relation to these measures must be undertaken prior to implementation so that relevant data can be collected over time.
70. The definition of a perennial river or stream within the glossary is not broad enough: “A stream that maintains water in its channel throughout the year or maintains a series of discrete pools that provide habitats for the continuation of the aquatic ecosystem”. This definition ignores the hydrological structure associated with stream channels. Flows are often hyporheic during dry

periods (flowing through the zone beneath the bed of the stream but above the groundwater). Aquatic life utilises this hyporheic zone for refuge and as part of reproductive phases. Access to these environments in an un-impacted state is critically important for aquatic biodiversity. During dry periods even perennial streams will only flow through the hyporheic and may be mis-classified as intermittent or ephemeral.

Effects on wetlands

71. The Society concerned that the NES provisions relating to wetlands fall well short of achieving the clear national requirement of protection:
72. Setbacks are only required from wetlands larger than 0.25 hectares. The RMA definition of wetlands includes permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions. There is no minimum size. Small wetlands can have very high ecological values and there is no basis for allowing them to be degraded or destroyed by forestry activities.
73. The setback from wetlands is only 5m. This is completely inadequate to protect wetland habitat, particularly when combined with the permitted status of riparian disturbance. The Scion report states that there is limited scientific information on the performance of a 5m riparian buffer in mitigating the effects of forestry activities on riparian areas and stream environments, and discusses the inadequacy of buffers of <10 metres in resisting adventive pioneering species.
74. Non-compliance with wetland setbacks should be a non-complying activity.
75. Permanent crossings may be installed in wetlands of less than 0.25 hectares as a permitted activity. The rationale is to prevent permanent crossings being installed on large wetlands, so as to protect the significant values of these wetlands. The reasoning behind only protecting the values of large wetlands is not clear. Permanent crossings will have very significant impacts on the hydrology and ecology of small wetlands.
76. Temporary crossings also have the potential to damage wetlands, and should only be allowed where the operator has demonstrated that they will not harm the wetland's values.
77. Activities that alter a wetland's hydrology (for example by altering water flows or the water table) are permitted by implication, and Councils are not able to be more stringent in order to protect wetlands from such activities.

Riparian vegetation

78. Riparian vegetation also deserves special protection because of its contribution to natural character of water bodies. Protection of natural character of rivers and their margins, like wetland protection, is a matter of national importance.

Proposed rules and permitted activity controls

Tiered approach to activity status to reflect gradient of risks

79. The activity status for listed forestry activities does not vary much between erosion susceptibility classes. Given the level of variation in draft permitted conditions between ESC classes, it would have arguably been more appropriate to simply specify two classes (e.g. high and low erosion susceptibility). Given the four levels of erosion risk in the existing ESC a tiered approach to activity status reflecting the gradient of increasing risk of adverse environmental effects would be more defensible. A more reasonable approach might be to apply permitted activity status in the green (low ESC) zone and in the yellow (moderate ESC) zone where slopes are less than 25°, controlled status in the yellow (moderate ESC) zone greater than 25° and orange (high ESC) zone less than 25°, and discretionary status in the higher ESC zones.
80. In addition, it seems incongruous that under the existing draft rules that in Orange (high ESC) zones where slopes are greater than 25° earthworks is a restricted discretionary activity, whereas forest quarrying is permitted.
81. Notwithstanding the issue of accuracy with the ESC zones discussed above, the draft conditions should be redrafted to provide a tiered system of activity status that more closely reflects differences in the ESC and associated environmental risks (e.g. permitted activity status in the green (low ESC) zone and in the yellow (moderate ESC) zone where slopes are less than 25°, controlled status in the yellow (moderate ESC) zone greater than 25° and orange (high ESC) zone less than 25°, and discretionary status in the higher ESC zones).

Harvest Plans, Quarry Management Plans, and Erosion and Sediment Control Plans

82. Harvest Plans, Quarry Management Plans, and Erosion and Sediment Control Plans are required to be prepared for harvesting, quarrying and earthworks, respectively. The requirements of these plans is broadly described yet it is unclear whether the plans will adequately capture the effects and provide robust mechanisms to avoid, remedy or mitigate adverse effects on the environment, as required by section 5 (2)(c) in the purpose of the Act.
83. The role of Councils is restricted to being advised when activities will begin and having the plans made available to them, on request. There is no provision for Councils (or any other body) to certify plans as adequate.
84. A related point is that the NES draft rules will result in reactive, rather than preventative, environmental protection. Where activities are permitted they are able to proceed without Council approval. Consequently, most activities will be able to proceed as permitted activities, until they are shown to breach a condition (through monitoring). By this time substantial environmental damage may have already been done. Forestry activities such as earthworks, quarrying and harvesting are irreversible and are often large in scale and happen very quickly. Remediation of environmental damage can be very costly and time consuming (as demonstrated by the nutrient enrichment problems in the Rotorua lakes, associated with land-use practices, which have proved very costly to tax-payers and the environment).

85. Commensurate with this concern is the lack of scale threshold for forest quarrying, which allows for forest quarries of any scale and size to operate as permitted activities under quarry management plans. Quarrying operations for other purposes/industries are not allowed to operate as permitted activities in most parts of the country.
86. The Society requests the provision in added to ensure that the content of management plans is clear and linked to avoidance, remedy or mitigation of effects. Plans should be made available to Councils by default, unless waived. Provision should also be made for Council to certify whether the plans meet requirements and to require amendments to ensure they are adequate **before** the activities are permitted to proceed.

Bed disturbance exclusions

87. Even during the 'peak spawning periods' listed, bed disturbance in the form of vehicle crossings and log hauling (in streams <3m wide) are still permitted. Given that the NES is supposedly science based²⁰, is there any evidence to suggest that these activities present any less risk of adverse impacts than other instream works, or is their exclusion simply a matter of expedience/convenience?
88. With the allowance of vehicle crossings and log hauling through streams less than 3 m wide the NES fails to recognise that a number of nationally critical and nationally endangered and nationally vulnerable fish species reside predominately in small streams < 3 m wide and these species require protection. Two of these threatened species, dusky galaxias, Eldon's galaxias have suffered a number of extinction events due to forest harvesting activities that have impacted on small streams. Other small stream species such as Taieri flathead have also suffered significant declines due to harvest activities. It is essential the NES recognise that small stream provide important habitat for a range of native fish including many threatened taxa and if the objective is to protect significance habitat these small stream require protection.
89. The Society requests a deletion of the exclusions under clause 2 of the fish spawning general conditions (page 84 of the hardcopy consultation document), unless clear scientific evidence is presented to support these exclusions.

Other controls

90. The Society **supports** applying setback distances from rivers, lakes, wetlands and the CMA for Afforestation, Earthworks, Mechanical Land Preparation and Replanting and the 20m setback in relation to forest quarrying. The Society also **supports** the inclusion of terrestrial and aquatic biodiversity and ecological effects (including effects on water quality) as matters of discretion for these activities when they occur within setbacks or in land classes where the activity is not automatically permitted. It would be useful to align the language better across the matters of discretion and permitted activity conditions so that clear guidance can be provided on what types of effects fit these criteria once the NES is operative.
91. The Society **does not support** Harvesting activities having no setback distances from rivers, lakes, wetlands and the CMA. The Society considers the Harvest Management Plan and permitted activity controls are insufficient to manage the potential adverse effects of harvest on the aquatic environment.
92. Riparian setback zones are of greatest importance during and following harvest, to maintain stream shading and sediment interception in particular, to support healthy freshwater ecosystems. Increased river water temperatures, that occur when riparian margins are removed as part of the harvest, can have long term negative effects on freshwater invertebrate communities and fish spawning, which is well documented in NZ. No felling into or across these

²⁰ One of the four principles underlying the NES draft rules is that "Understanding the risk of adverse effects on the environment around the country should be informed by up-to-date science."

zones should be permitted as of right, they should be controlled activities subject to case specific consent conditions and monitoring.

93. Stabilisation and containment following earthworks activities should be required to occur much sooner than the 12 month permitted activity condition. Stabilisation and containment of areas potentially contributing sediment to waterways is critical to reduce the ongoing environmental effects following earthworks.
94. The document is inconsistent around whether tracking is included as earthworks or not – this requires clarification throughout the document.
95. Pruning and thinning to waste risks are defined as: “Pruning and thinning-to-waste typically have **minor** environmental effects limited to issues with where the pruned or thinned material is deposited...” Effects on aquatic life from pruning and thinning to waste can be significant (and certainly more than minor) if prunings and thinned trees are allowed to fall into water courses and depending on the scale and severity. The Society **does not support** the use of the term “minor” within the definition of the risks and requests it is removed from this section.
96. The permitted activity condition requiring debris not to be deposited in perennial water bodies should apply to **ALL** waterbodies. The Society **does not support** the permitted activity status only applying to perennial water bodies for the reasons stated above. Additionally, the term “practicable” should be removed from the note regarding removal of slash to read “Slash should be removed from a water body only if it is safe and practicable to do so.”
97. Setback distance for replanting should relate to **ALL** water bodies not just perennial water bodies, to avoid future effects on the aquatic ecology of intermittent streams.
98. An intermittent stream is hydrologically connected to downstream perennial channels, but may not have standing pools above ground. Above-ground flow may cease at times of the year when rainfall is low. Intermittent streams have a defined streambed, often covered with a hard substrate (eg. gravels, cobbles or bedrock) under natural conditions, regardless of the channel width. Many of these intermittent streams would be identified on a topomap or REC as first order streams, and thus should be identifiable by foresters prior to a site visit to confirm.
99. Intermittent streams are the beginnings of the catchment. Water quality impacts to intermittent streams (such as sediment discharge) contribute significantly to increasing cumulative water quality issues downstream in perennial rivers. Intermittent streams are also extremely important ecological habitats for aquatic life and play an important role in maintaining aquatic and terrestrial biodiversity. Macroinvertebrates and native fish take refuge in intermittent streams when conditions are unsuitable downstream and for some species (including national vulnerable taxa like lamprey and shortjaw kōkopu) the riparian vegetation alongside headwater intermittent and perennial streams are important spawning habitats during autumnal freshes. It is important that destructive forestry activities are set back from intermittent streams.

General conditions

100. The relationship between the general conditions and other controls requires clarification. General conditions should apply “in addition to” general controls.
101. Standard provisions require bunds and other mitigation measures for refuelling and storage of fuels and other chemical on forestry sites should be included as permitted conditions. Rather than *minimising* the risk of fuels entering waterbodies, the more appropriate term would be to *avoid* fuels entering water.
102. The Society **does not support** the permitted activity provisions relating to vegetation clearance and disturbance. In our view these conditions are entirely unacceptable and should be rewritten to ensure erosion and sedimentation of waterbodies, effects on riparian vegetation and adverse effects on indigenous biodiversity (terrestrial and aquatic) are avoided. Additionally, vegetation clearance is not just a District jurisdictional matter but is a core Regional function as well. The table should acknowledge this appropriately.
103. The Society **does not support** the provision relating to spatial bundling. Spatial bundling should relate to the most erosion-prone ESC class, not the least as significant sedimentation effects on water quality can occur from even small areas of highly erosion prone land.
104. The Society **does not support** the limited provisions relating to bed disturbance of permanently flowing streams or rivers as a permitted activity. The conditions are ill-informed and lack sufficient science foundation or evidential basis. There are far more native fish species of significant conservation value than the species listed in the table. All New Zealand’s native fish fauna are susceptible to sediment to a greater or lesser degree and this susceptibility is not just related to spawning times. Resident fish and juvenile recruitment are also adversely affected by sediment and the extent of effects downstream depends on the scale and severity of the sedimentation events, but in most cases will likely exceed more than 1km of river length.
105. The Society **does not support** the exclusions 2a and b of fording or partially suspended hauling as bed disturbance activities. These activities clearly disturb the bed and the width of the river is not a relevant threshold for how significant the effects generated by these activities are.
106. The Society **does not support** the exclusion at 3 applying to bed disturbance activities when a fish survey within the last 12 months has not found species listed at 1c. Many taxa in New Zealand’s native fish fauna are highly mobile, due to their diadromous (migratory) life-histories.
107. The Society **does not support** slash traps that are not constructed or maintained in a fish passable manner. The provision for slash traps must include a condition relating to fish passage.
108. Matters of control for general conditions should include specific reference to aquatic ecology, in addition to the conditions already listed. The Society requests this matter is included.

109. The Society **supports** the exclusion of permitted activity status for fords in waterways identified as habitat for threatened indigenous fish or for fish spawning (indigenous or native fish) and the matters of control related to the effects of river crossings on aquatic ecosystems including fisheries and indigenous biodiversity.
110. The ability to be more stringent in relation to outstanding water bodies needs to be clarified. Will the application of more stringent rules require further Councils to undertake Plan Change processes? Water Conservation Orders (“WCOs”) should also be added into this table, WCOs are mentioned within the text of the document (Table 4) in relation to more stringent rules for outstanding water bodies but has been omitted from the rules section of the document. The Society requests that WCO be added into this table if it is to be used as the definition of the rules in the operative NES. Reference is also needed to the NPS Freshwater.
111. Allowance for more stringent rules in relation to forestry activities on land associated with shallow aquifers should apply to all forestry activities, particularly afforestation and replanting, rather than just forest quarrying. This is inconsistent with the provisions to be more stringent listed in Table 4 within the document.

Errors

112. There are several other apparent typos, which if left uncorrected would make the intent of the rules ambiguous or confusing. For example, page 64 of the hardcopy consultation document states: “Permitted activity conditions for earthworks for road widening and realignment for safety purposes includes a condition that “the volume moved is more than 5000 m³ per activity area”, presumably this should be “is not more than...”?
113. Additionally, page 72 of the hardcopy consultation document states: ““Mechanical land preparation is permitted: ...in Orange and Red zones where the slope is greater than 25 degrees but the technique used affects the subsoil” presumably this should read “but the technique used does **not** affect the subsoil”, since on the following page mechanical land preparation is listed as Restricted discretionary for these same zones and slope conditions where “the technique used affects the subsoil”.
114. Page 75 of the hardcopy consultation document states: “Quarrying is permitted in all zones except Red Zone where the ESC identifies land as having the potential for severe or very severe earthflow or slump erosion, provided the permitted activity conditions are met”. Whereas the next page states that quarrying is a controlled activity in these same zones, **or** where any of the permitted activity conditions (except property setbacks) cannot be met. It is not clear whether permitted or controlled activity status is intended to apply here.

Conclusion

115. The NZFSS does not support the NES in its current form and request that our comments within the submission are included in the operative document. The Society are happy to provide support and advice to MPI in implementing our suggested changes in a constructive manner through the Executive Committee.

A handwritten signature in black ink, appearing to read 'M. Schallenberg', with a long horizontal stroke underneath.

Dr Marc Schallenberg

President

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