From: Richard Maloney
To: Ken Hughey
Cc: Colin O"Donnell; Alexander Macdonald
Subject: Scenarios for levels of value management Lower Waitaki - DOC-6963357.xlsx
Date: Tuesday, 29 March 2022 3:42:29 pm
Attachments: Scenarios for levels of value management Lower Waitaki - DOC-6963357.xlsx

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Hi Ken

Here is a first draft. The two red tabs show the costs and the treatment levels (targets). The rest is workings, mostly based on Lewis and Maloney doco. I haven't seen Nga Awa costings.

Suggest the costs need a check, and need ~20-30% contingency added given the degree of uncertainty and rapidly changing costs in NZ at the moment. It's a few weeks work to build this at a more detailed scale as per a business case. Here's the list of key assumptions/changes/guesses on my part to give you a feel for likely error in the estimates.

- Some of the line items need checking and I do not have the detailed knowledge to know how to construct these – my best guess is included to get us started - e.g., what has the loss of ground water fed springs?, and therefore what is the offset in terms of number of weirs for native fish safe zones? I have estimated habitat loss as a factor of kms of river length, and declared some weir numbers to represent no net loss.
- Some elements are simply estimates (e.g., future mitigation/actions based on what we learn from knowledge gaps – I have used a nominal amount here).
- Some elements I have increased costs solely based on likely reasonable changes to costs (e.g. bulldozing was $2000/ha in Lewis and Maloney, but I made this $3000 to cover additional costs such as resource consents, and increased fuel and contractor costs since we wrote the report).

Let me know what else is required here. It would be useful to have a few more eyes over this.

I think the scenario 3 is actually the reasonable one here – do we need to work up a higher level cost scenario based on increased standards of health, and shorter time frames for delivery. I suspect that this would add ~20+% or more to the total costs for scenario 3, without even considering other activities.

Alternatively, we could add in a range of costs against each scenario (e.g. "Scenario 3: $1.1 - 1.4 mill per annum").

Cheers

Richard

Situation River dynamics over the full length of the Lower Waitaki changed through severe modifcation of flow regimes, changes in sedimentation movement and bank erosion, resulting in increased stability of channels, channelisation, enhanced
Values Many braided bird and freshwater fish values still present, but depleted and under threat. Lizard, terrestrial invertebrate and plant values not well mapped or understood over the full river length. Residual wetlands present but heavily
Length and areas The Lower Waitaki is ~62km in length and 7000 ha in area, of which around 2200 ha is water and 4800 ha land.

Scenarios	Scenario 1: Do the bare minimum.	Scenario 2: Moderate protection of values in limited areas.	Scenario 3: Replace values at scales similar to those that were lost.
Key actions	Scenario 1 key actions Establish and maintain 15 islands and 4 x 2km sections of exemplar braid plain, including weed and predator control. Recover key wetlands and side streams. Fill knowledge gaps in lizards and terrestrial invertebrates, and in native fish management.	Scenario 2 key actions Establish and maintain 30 islands and 3 x 5km sections of braid plain (24% of available braid plain), so that threatened bird populations are secured. Recover most key wetlands and side streams. Fill knowledge gaps in lizards and terrestrial invertebrates, and in native fish management and act on key findings. At restored sites, manage weed and predator pressures which are exacerbated by low and controlled flows.	Scenario 3 key actions Establish and maintain the braid plain at a rate of 2.5km per annum over 24 years to achieve 100% of available braid plain. Provide islands over 1.2% of land area immediately to secure threatened species. Recover all key wetlands and side streams as part of a connected braid plain, and further provide adequate off-site habitat management to protect native freshwater fish values that cannot be protected in situ. Fill knowledge gaps in lizards and terrestrial invertebrates, and in native fish management and act on key findings, including finding solutions to barriers to migration. Manage weed and predator pressures which are exacerbated by low and controlled flows.
What management looks like	Populations secured for some taxa, others unmanaged. Small patches of wetland and river habitat managed. Limited improvement in knowledge of taxa and pressures, and this translates to management for significant findings.	All threatened taxa are recovered. Exemplar areas of the braid plain and wetlands are managed. Gaps in knowledge for taxa and pressures are filled, and key gaps are acted on.	Threatened taxa are recovered and thriving. Large areas of the affected braid plain and associated wetlands are re-estabilised and are largely functioning. Gaps in knowledge for taxa and pressures are filled and acted on.
Focus detail	Adaptive approaches are used. Focus is on management of black-fronted terns and banded dotterels in the braid plain, and on mudfish habitats in the wetland areas. ~15 islands of at least 1 ha are created and managed (0.3% of land area). Braid plain is cleared and managed in 2km long sections in four locations as exemplar sites (13% of river length). Research into terrestrial invertebrate and lizard fauna distribution, diversity and management needs, and into better management techniques for freshwater fish populations is carried out.	Adaptive approaches are used. Focus is on management of all braided river species in the braid plain, and on mudfish, inanga and bittern habitats in the wetland areas. Islands around 1-10 ha created every 2km along the length of the river (at 10 ha this is 1.2% of land area cleared), and the braid plain is managed and cleared in 3 x 5 km sections of the river (24% of river length). Research into terrestrial invertebrate and lizard fauna distribution and diversity, and management needs, and into better management techniques for freshwater fish populations is carried out, and all key findings are implemented. Management of threatened fish populations occurs outside the Lower Waitaki to replace side stream habitats no longer recoverable.	Adaptive approaches are used. Focus is on management of all braided river species in the braid plain, and on mudfish, inanga and bittern habitats in the wetland areas. Islands around 1-10 ha created every 2km along the length of the river (at 10 ha this is 1.2% of land area cleared), and these islands are eventually subsumed under the braid plain clearance. The braid plain is managed and cleared at 5 km per year over 12 years to achieve 100% of river length, then is managed at that level. Research into terrestrial invertebrate and lizard fauna distribution and diversity, and management needs, and into better management techniques for freshwater fish populations is carried out, and all key findings are implemented. Management of threatened fish populations occurs outside the Lower Waitaki to replace side stream habitats no longer recoverable.
Management activities types	Island bulldozing, willow clearance from wetlands and some restorative wetland planting. Additional enhancement of braided river values by tweaking activities around flood control works. Targetted invertebrate and lizard sampling in a range of habitats across the full length of the site.	Island bulldozing and other weed removal and followup management techiques, willow clearance from wetlands and restorative wetland planting. Additional enhancement of braided river values by tweaking activities around flood control works. Targetted invertebrate and lizard sampling in a range of habitats across the full length of the site, with further actions adopted once results known. Weir building and trout removal in smaller streams and seepages to benefit threatened fish. Tuna and inanga populations managed and are recovering.	Island and bank area bulldozing and other weed removal and followup management techiques. Willow clearance from wetlands and restorative wetland planting. Additional enhancement of braided river values by tweaking activities around flood control works. Targetted invertebrate and lizard sampling in a range of habitats across the full length of the site, with further actions adopted once results known. Weir building and trout removal in smaller streams and seepages to benefit threatened fish. Tuna and inanga populations managed and are recovering.
Management by others	[redacted] fairway clearance and flood control works continue. DOC Nga awa programme continues, and includes wider land use impacts on the freshwater system.	[redacted] fairway clearance across the rest of the site, and flood control works continue. DOC Nga awa programme continues, and includes wider land use impacts on the freshwater system.	[redacted] fairway clearance superceded by the braid plain clearance work. Flood control works continue. DOC Nga awa programme continues and focusses on wider land use impacts on the freshwater system.

Key actions	Islands creation	Islands replacement	Braid plain clearance	Weed maintenance - cleared areas	Small mammal predator mgmt at cleared areas	Black backed gull predator control	Wetlands cleared	Wetlands restored planting	Offsite native fish protection	Knowledge gaps filled	Application of key findings from knowledge gaps
Calculations	At 1 ha each	At full replacement every 0 years (10% per annum)	at 77ha per km (4800ha land area/62km)	At islands braid plain in ha	At islands braid plain in ha	At colonies	At 1 wetland per 5 kms = 12 per side = 24 in total:	At 1 wetland per 5 kms	At $31300 average annual $31300 per annum	At $30k each per annum for 3 years for lizards	Nomina ly at $ 00k each for lizards fish and terr inverts
Costs	At $3000 per ha creation	At $3000 per ha re-creation per annum	At $3000 per ha creation	At 15% of habitat area created per annum = $50 per ha	At 200m spacing = 9 traps per 16ha. At $5 per trap maintenance	At $30 000 per colony per year for 5 years. Estimated 10 colonies.	At $3000 per ha cleared	At $15 per plant per annum for			
Scenario 1 key actions: Establish and maintain 15 islands and 4 x 2km sections of exemplar braid plain including weed and predator control. Recover key wetlands and side streams. Fill knowledge gaps in lizards and terrestrial invertebrates and in native fish management.	15	1.5	8km	631	631	50% = 5	50% = 12 = 120 ha	50% = 12 = 120 ha = 1200 plants	50% = 15	lizards terrestrial invertebrates fish	$300 000
Scenario 2 key actions: Establish and maintain 0 islands and 3 x 5km sections of braid plain (24% of available braid plain) so that threatened bird populations are secured. Recover most key wetlands and side streams. Fill knowledge gaps in lizards and terrestrial invertebrates and in native fish management and act on key findings. At restored sites manage weed and predator pressures which are exacerbated by low and controlled flows.	0	3	15km	1185	1185	80% = 8	80% = 19 = 190 ha	80% = 19 = 190 ha = 1900 plants	80% = 25	lizards terrestrial invertebrates fish	$300 000
Scenario 3 key actions: Establish and maintain the braid plain at a rate of 2.5km per annum over 24 years to achieve 100% of available braid plain. Provide islands over 1.2% of land area immediately to secure threatened species. Recover all key wetlands and side streams as part of a connected braid plain and further provide adequate off-site habitat management to protect native freshwater fish values that cannot be protected in situ. Fill knowledge gaps in lizards and terrestrial invertebrates and in native fish management and act on key findings including finding solutions to barriers to migration. Manage weed and predator pressures which are exacerbated by low and controlled flows.	60 ha	6	62km	4834	4834	100% = 10	00% = 24 = 240 ha	100% = 24 = 240 ha = 2400 plants	100% = 31	lizards terrestrial invertebrates fish	$300 0

Key actions	Is ands c ea ion	Is and c eat on cos s	slands eplacement	sland eplacement costs	B a d pla n clea ance	B a d p a n c ea ance cos s	Weed ma ntenance - c ea ed a eas	Weed ma ntenance - clea ed a eas co ts	Small mammal p edato mgmt at clea ed a eas	Sma l mammal p eda o m mt at c ea ed a eas costs	Black backed gu l p edato cont ol	B a k backed gu l p eda	We lands clea ed	Wet ands c ea ed cos s	Wetlands e to ed p an ing	Wetlands e	O ite nat ve sh	O ite nat	Knowledge aps i led	Know edge gaps l ed costs	Appl cat on o key ndings om know edge gaps	Appl cat o n o key ndings
Calcu at ons	At 1 ha each		At u l eplacement eve y 10 vea s (10% pe annum)		at 77ha pe m (4800ha and a ea 62km)		At i lands + b a d pla n n ha at 15% o habi at a ea c eated		At slands + b a d p ain in ha		At colon es		At 1 wet and pe 5 kms 12 pe s de 24 n total At 10ha pe we land		At 1 we land pe 5 kms		At $31300 ave age annual		At $30k each pe annum o 3 vea s o iza ds		Nomina ly at $100k each o i a ds sh and e inve s	
Costs	At $3000 pe ha c ea ion		At $3000 pe ha main enance bui d pe 10 vea s		At $3000 pe ha c eat on		At $50 pe t eated ha		At 200m spacing 9 t aps pe 16ha At $5 pe t ap ma n enance		At $30 000 pe colony pe yea o 5 yea s Es ima ed 10		At $3000 pe ha clea ed		At $15 pe plant pe		$31300 pe annum		za ds $90k Na ive i h $90k Te e t al			
Scena o 1 key act ons Establ sh and ma n ain 15 slands and 4 x 2km sect on o exempla b a d p ain ncluding weed and p edato cont ol Recove key wetlands and s de st eams ll know edge gaps in l za ds and te est al nve teb ates and in nati e sh management	15	$45 000	1 5	$15 750	8km	$1 848 000	631	$1 104 250	631	$1 680 629	50% 5	$750 000	50% 12 120 ha	$360 000	50% 12 120 ha 1200 p an s	$180 000	50% 15	$469 500	iza ds te e t al inve eb ates sh	$580 000	Highest p o ty 50%) o ecommendations taken up	$150 000
Scena o 2 key act ons Establ sh and ma n ain 30 slands and 3 x 5km sect on o b aid pla n 24% o avai able b aid pla n) so that h eatened bi d populat ons a e secu ed Recove most key we lands and s de st eams i l know edge gaps in l za ds and te est al inve teb ates and in na ive i h management and act on ey ndings At esto ed s tes manage weed and p edato p essu es which a e exace ba ed by ow and cont o led lows	30	$90 000	3	$31 500	15km	$3 465 000	1185	$2 073 750	1185	$3 156 173	80% 8	$1 200 000	80% 19 190 ha	$570 000	80% 19 190 ha 1900 p an s	$285 000	80% 25	$782 500	iza ds te e t al inve eb ates sh	$580 000	Most 80%) o ecommendations taken up	$240 000
Scena o 3 key act ons Es ab i h and mainta n the b aid pla n at a ate o 2 5km pe annum ove 24 yea s o achieve 100% o avai able b aid pla n P ov de slands ove 1 2% o and a ea mmed ate y to secu e th eatened spec es Re ove a l key we lands and s de st eams as pa t o a connected b a d p ain and u the p ovide adequa e o si e habi at management o p otect nat ve eshwa e ish values that cannot be p o ected n s tu ll know edge gaps in l za ds and te est al inve teb ates and in na ive i h management and act on ey ndings nclud ng nding solut ons o ba e s to mig a ion Manage weed and p edato p essu es which a e exace bated by ow and cont ol ed lows	60 ha	$180 000	6	$63 000	62km	$14 322 000	4834	$8 459 500	4834	$12 875 057	100% 10	$1 500 000	100% 24 240 ha	$720 000	100% 24 240 ha 2400 p an s	$360 000	100% 31	$970 300	iza ds te e t al inve eb ates sh	$580 000	Al (100%) o key ecommendations taken up	$300 000

Lower Waitaki Activities	Scenario 1	Scenario 2	Scenario 3
Island creation	$45,000	$90,000	$180,000
Island replacement	$15,750	$31,500	$63,000
Braid plain clearance	$1,848,000	$3,465,000	$14,322,000
Weed maintenance - cleared areas	$1,104,250	$2,073,750	$8,459,500
Small mammal predator mgmt at cleared areas	$1 680 629	$3 156 173	$12 875 057
Black backed gull predator control	$750,000	$1,200,000	$1,500,000
Wetlands cleared	$360,000	$570,000	$720,000
Wetlands restored planting, fencing	$180,000	$285,000	$360,000
Offsite native fish protection using weirs and pest fish removal	$469,500	$782,500	$970,300
Knowledge gaps filled	$580,000	$580,000	$580,000
Application of key findings from knowledge gaps	$150,000	$240,000	$300,000
TOTAL per SCENARIO over 35 years	**$7,183,129**	**$12,473,923**	**$40,329,857**
TOTAL per SCENARIO annual average*	**$205,232.26**	**$356,397.81**	**$1,152,281.63**

**there are generally higher costs in years 1-10*

Key actions	*Scenario 1 key actions: Establish and maintain 15 islands and 4 x 2km sections of exemplar braid plain, including weed and predator control. Recover key wetlands and side streams. Fill knowledge gaps in lizards and terrestrial invertebrates, and in native fish management.*	*Scenario 2 key actions: Establish and maintain 30 islands and 3 x 5km sections of braid plain (24% of available braid plain), so that threatened bird populations are secured. Recover most key wetlands and side streams. Fill knowledge gaps in lizards and terrestrial invertebrates, and in native fish management and act on key findings. At restored sites, manage weed and predator pressures which are exacerbated by low and controlled flows.*	*Scenario 3 key actions: Establish and maintain the braid plain at a rate of 2.5km per annum over 24 years to achieve 100% of available braid plain. Provide islands over 1.2% of land area immediately to secure threatened species. Recover all key wetlands and side streams as part of a connected braid plain, and further provide adequate off-site habitat management to protect native freshwater fish values that cannot be protected in situ. Fill knowledge gaps in lizards and terrestrial invertebrates, and in native fish management and act on key findings, including finding solutions to barriers to migration. Manage weed and predator pressures which are exacerbated by low and controlled flows.*

Lower Waitaki Activities	Calculations	Scenario 1	Scenario 2	Scenario 3
Islands creation	At 1 ha each	15 islands	30 islands	60 ha worth of islands
Islands replacement	At full replacement every 10 years (10% per annum)	1.5 islands replaced per annum	3 islands replaced per annum	6 islands replaced per annum
Braid plain clearance	at 77ha per km (4800ha land area/62km)	8 km braid plain cleared	15 km braid plain cleared	62 km braid plain cleared
Weed maintenance - cleared areas	At islands + braid plain in ha at 15% of habitat area created	631 ha area created	1185 ha area created	4834 ha area created
Small mammal predator mgmt at cleared areas	At islands + braid plain in ha	631 ha area created	1185 ha area created	4834 ha area created
Black backed gull predator control	At colonies	50% = 5 colonies	80% = 8 colonies	100% = estimated at 10 colonies
Wetlands cleared	At 1 wetland per 5 kms = 12 per side = 24 in total: At 10ha per wetland	50% = 12 wetland sites = 120 ha of wetlands	80% = 19 wetland sites = 190 ha of wetlands	100% = 24 wetland sites = 240 ha of wetlands
Wetlands restored planting, fencing	At 1 wetland per 5 kms = 12 per side = 24 in total: At 10ha per wetland.	50% = 12 = 120 ha = 1200 plants	80% = 19 = 190 ha = 1900 plants	100% = 24 = 240 ha = 2400 plants
Offsite native fish protection using weirs and pest fish removal	At $31300 average annual cost per weir including pest removal, and replacement costs. Offset lost sidestream water table habitat at 1 weir per 2km of river length equivalent = 31 weirs	50% = 15 weirs built, maintained and pest fish removed	80% = 25 weirs built, maintained and pest fish removed	100% = 31 weirs built, maintained and pest fish removed
Knowledge gaps filled	At $30k each per annum for 3 years for lizards and fish, and $80k per annum for invertebrates on land for 5 years (includes sorting and referencing costs).	Distribution and diversity of lizards, terrestrial invertebrates, fish identified	Distribution and diversity of lizards, terrestrial invertebrates, fish identified	Distribution and diversity of lizards, terrestrial invertebrates, fish identified
Application of key findings from knowledge gaps	Nominally at $100k each for lizards, fish and terr inverts from year 6.	Highest priority (50%) of recommendations taken up	Most (80%) of recommendations taken up	All (100%) of recommendations taken up

Key actions	Calculations	Scenario 1 key actions: Establish and maintain 15 islands and 4 x 2km sections of exemplar braid plain, including weed and predator control. Recover key wetlands and side streams. Fill knowledge gaps in lizards and terrestrial invertebrates, and in native fish management.	Scenario 2 key actions: Establish and maintain 30 islands and 3 x 5km sections of braid plain (24% of available braid plain), so that threatened bird populations are secured. Recover most key wetlands and side streams. Fill knowledge gaps in lizards and terrestrial invertebrates, and in native fish management and act on key findings. At restored sites, manage weed and predator pressures which are exacerbated by low and controlled flows.	Scenario 3 key actions: Establish and maintain the braid plain at a rate of 2.5km per annum over 24 years to achieve 100% of available braid plain. Provide islands over 1.2% of land area immediately to secure threatened species. Recover all key wetlands and side streams as part of a connected braid plain, and further provide adequate off-site habitat management to protect native freshwater fish values that cannot be protected in situ. Fill knowledge gaps in lizards and terrestrial invertebrates, and in native fish management and act on key findings, including finding solutions to barriers to migration. Manage weed and predator pressures which are exacerbated by low and controlled flows.

From:	Richard Maloney
To:	Ken Hughey; Colin O"Donnell; Alexander Macdonald
Subject:	Lower Waitaki scenarios for managing values - DOC-6961210
Date:	Monday, 28 March 2022 1:14:22 pm
Attachments:	Lower Waitaki scenarios for managing values - DOC-6961210.docx
Importance:	High

Hi Ken, Colin, Alex

Here's my first take on describing scenarios as per Ken's request. I've left it reasonably wordy so as to capture my thinking.

Feedback needed asap - if you like this, I will then add the dollars.

Ken – you asked for minimum, and higher levels – lets test this – I actually think that the Scenario 3 is the minimum option if we are aiming to replace what has been lost, noting that this can be done with fairly low inputs annually over many years = clear 2.5 km of riverbed per year for 24 years. Why would we be aiming for anything less?

Richard

Lower Waitaki River: Scenarios for managing values

Situation: River dynamics over the full length of the Lower Waitaki River have changed through severe modification of flow regimes, changes in sedimentation movement and bank erosion, resulting in increased stability of channels, channelisation, enhanced weed establishment on islands and riparian areas. Reduced water flow has reduced quantity of side streams, and backwaters. Change impact on all native taxa types as both terrestrial and aquatic habitats modified. Impacts are direct and indirect (such as: increased island stability increases weeds which harbour predators and reduce nest site availability and quality for birds). Overall the braid plain is much reduced in area and greatly reduced in function. Dam structures further limit connectivity, particularly preventing the migration of freshwater fish.
Values: Many braided bird and freshwater fish values still present, but depleted and under threat. Lizard, terrestrial invertebrate and plant values not well mapped or understood over the full river length. Residual wetlands present but heavily modified. Braid plain largely present, but functioning poorly - woody weeds largely controlled in the fairway areas, but river is channelised with a high degree of island stability and reduced braiding caused by controlled flows and cumulated weed binding. There is poor horizontal connectivity, longitudinal connectivity existings within the 62km length of lower river but is lost upstream due to the presence of dams and lakes. Some riparian habitat types are irretrievably lost within the system at former scales (e.g., ground water-fed side streams and backwaters).
Length and areas: The Lower Waitaki is ~62km in length and 7000 ha in area, of which around 2200 ha is water and 4800 ha land.

Scenarios	**Scenario 1: Do the bare minimum.**	**Scenario 2: Moderate protection of values in limited areas.**	**Scenario 3: Replace values at scales similar to those that were lost.**
Key actions	Scenario 1 key actions: Establish and maintain 15 islands of around 1ha (0.3% of terrestrial area), and 4 x 2km sections of exemplar braid plain (12% of modified length), including weed and predator control. Recover key wetlands and side streams. Fill knowledge gaps in lizards and terrestrial invertebrates, and in native fish management.	Scenario 2 key actions: Establish and maintain 30 islands (0.6% of terrestrial area) and 3 x 5km sections of braid plain (24% of available braid plain), so that threatened bird populations are secured. Recover most key wetlands and side streams. Fill knowledge gaps in lizards and terrestrial invertebrates, and in native fish management and act on key findings. At restore sites, manage weed and predator pressures which are exacerbated by low and controlled flows.	Scenario 3 key actions: Establish and maintain the braid plain at a rate of 2.5km per annum over 24 years to achieve 100% of available braid plain. Provide islands over 1.2% of land area immediately to secure threatened species. Recover all key wetlands and side streams as part of a connected braid plain, and further provide adequate off-site habitat management to protect native freshwater fish values that cannot be protected in situ. Fill knowledge gaps in lizards and terrestrial invertebrates, and in native fish management and act on key findings, including finding solutions to barriers to migration. Manage weed and predator pressures which are exacerbated by low and controlled flows.
What management looks like	Populations secured for some taxa, others unmanaged. Small patches of wetland and river habitat managed. Limited improvement in knowledge of taxa and pressures, and this translates to management for significant findings.	Most threatened taxa are recovered, but some that require significant habitat areas are not (e.g., banded dotterels). Exemplar areas of the braid plain and wetlands are managed. Gaps in knowledge for taxa and pressures are filled, and key gaps are acted on.	Threatened taxa are recovered and thriving. Large areas of the affected braid plain and associated wetlands are re-established and are largely functioning. Gaps in knowledge for taxa and pressures are filled and acted on.

Focus detail	Adaptive approaches are used. Focus is on management of black-fronted terns and banded dotterels in the braid plain, and on mudfish habitats in the wetland areas. ~15 islands of at least 1 ha are created and managed (0.3% of land area). Braid plain is cleared and managed in 2km long sections in four locations as exemplar sites (13% of river length). Research into terrestrial invertebrate and lizard fauna distribution, diversity and management needs, and into better management techniques for freshwater fish populations is carried out.	Adaptive approaches are used. Focus is on management of all braided river species in the braid plain, and on mudfish, inanga, and bittern habitats in the wetland areas. Islands around 1-10 ha created every 2km along the length of the river (at 10 ha this is 1.2% of land area cleared), and the braid plain is managed and cleared in 3 x 5 km sections of the river (24% of river length). Research into terrestrial invertebrate and lizard fauna distribution and diversity, and management needs, and into better management techniques for freshwater fish populations is carried out, and all key findings are implemented. Management of threatened fish populations occurs outside the Lower Waitaki to replace side stream habitats no longer recoverable.	Adaptive approaches are used. Focus is o management of all braided river species in the braid plain, and on mudfish, inanga, and bittern habitats in the wetland areas. Islands around 1-10 ha created every 2km along the length of the river (at 10 ha this is 1.2% of and area cleared), and these islands are eventually subsumed under the braid plain clearance. The braid plain is managed and cleared a 5km per year for 12 years to achieve 100% of river length, then is managed a this level. Research into terrestrial invertebrate and lizard fauna di tribution and diversity, and management needs, and into better management techniques for freshwater fish populations is carried out, and all key findings are implemented. Management of threatened fish populations occurs outside the Lower Waitaki to replace side stream habitats no onger recoverable.
Management activities types	Island bulldozing, willow clearance from wetlands and some restorative wetland planting. Additional enhancement of braided river values by tweaking activities around flood control works. Targeted invertebrate and lizard sampling in a range of habitats across the full length of the site.	Island bulldozing and other weed removal and follow up management techniques, willow clearance from wetlands and restorative wetland planting. Additional enhancement of braided river values by tweaking activities around flood control works. Targeted invertebra e and lizard sampling in a range of habitats across the full length of the si e, w th further actions adopted once results known. Weir building and rout removal in smaller streams and seepages to benefit threatened fish. Tuna and inanga populations managed and are r covering.	Island and bank area bulldozing and other weed removal and follow up management techniques. Willow clearance from wetlands and restorative wetland planting. Additional enhancement of braided river values by tweaking activities around flood control works. Targeted invertebrate and lizard sampling in a range of habitats across the full length of the site, with further actions adopted once results known. Weir building and trout removal in smaller streams and seepages to benefit threatened fish. Tuna and inanga populations managed and are recovering.
Management by others	[redacted] fairway clearance and flood control works continue. DOC Nga awa programme continues and includes wider land use impacts on the freshwater system.	[redacted] fairway clearance across the rest of the site, and flood control works continue. DOC Nga wa prog amme continues and includes wider land use impacts on the freshwater system.	[redacted] fairway clearance superseded by the braid plain clearance work. Flood control works continue. DOC Nga awa programme continues and focusses on wider land use impacts on the freshwater system.

From:	Jo Macpherson
To:	Ken Hughey; Colin O"Donnell; Richard Maloney; Alexander Macdonald; Dean Nelson
Subject:	Initial DOC picture of a biodiversity rich Waitaki - DOC-6954880
Date:	Tuesday, 22 March 2022 3:51:03 pm
Attachments:	Meridian Genesis preconsultation Waitaki - DOC-6951050 (002) Dean+ Colin comments (002).docx Initial DOC picture of a biodiversity rich Waitaki - DOC-6954880.docx

Kia ora

I have attached the final version I am just about to send to the Generators. I have also attached the marked up version before I accepted track changes and including all comments FYI for context. There are a couple of things we still need to discuss in the comments bar.

Eg: we still need to consider where our line is in the sand on what we call the upper Waitaki and the Lower Waitaki – we could discuss that tomorrow. I also need to send out a new invite to our weekly meet, and ask Chris to cancel the one he set up too.

Well done to everyone, the meeting on Thursday will be interesting to see first reactions.

Jo Macpherson
National Operations
Department of Conservation – *Te Papa Atawhai*
DDI: +64 272 480 255
www.doc.govt.nz

Reconsenting Waitaki Power Scheme pre-consultation

INTENT:
The parties (the Department of Conservation, Meridian Energy and Genesis Energy) will work towards an agreement over the next two months that will exceed any likely outcome from the resource consenting process (including the Environment Court).

The parties:

- acknowledge that the construction and ongoing operation of the first hydro-electric dam (built in 1926) and subsequent developments have led to significant alteration to ecosystem processes and to overall environmental degradation. We recognise that there have also been some gains.
- note the importance for nature conservation of the continuity of natural processes, within the limits associated with the cost-effective production of sustainable energy from freshwater in the Waitaki catchment. This understanding sits within the context of the National Policy Statement (Renewable Generation) and regional water allocation, which sit within the framework of the Waitaki Catchment Water Allocation Regional plan.
- acknowledge that a lot has been learned over the last three decades, through Project River Recovery (PRR) and other means. These ~~learnings~~ lessons will enable us to work at larger scales and greater pace into the future, with confidence around expected conservation benefits. By using an adaptive learning and management approach over time, we will further improve these opportunities.
- acknowledge Ki uta Ki Tai & Te Mana o Te Wai.

PRINCIPLES
The *Terms of Reference in relation to re-consenting with Waitaki power scheme* (TOR) was signed in October 2021 and set out a list of agreed principles (refer to Appendix 1). These were discussed on 15th March 2022 and largely accepted, with some minor additions. The revised set of principles are listed below:

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  Agreements will focus on tangible and practical results on the ground while recognising NZ's climate change commitments and the need for renewable energy
- **Scope**
  Agreements will focus on existing activities and replacement consents rather than expansion.

Commented [CO1]: Not sure what you are getting at here - to what end??

.....for biodiversity conservation?

Commented [KH2R1]: done

Commented [DN3]: There are still unknowns that need further research or investigation before we can effectively manage them. Also we need to acknowledge that new tools and technologies will help in the future.

Commented [CO4R3]: I agree

Commented [KH5R3]: Made changes but note next sentence covers learning going forward

Commented [CO6]: What type of outcomes?

For conservation?
For restoration?
For biodiversity?

Commented [KH7R6]: done

OUTCOME STATEMENT

The parties discussed[1] and built on the three aims of DOC's Ngā Awa programme and agreed on the following outcome statement:

> *Improve the condition, biodiversity, ecological processes and other values of the braided rivers and associated environment including the wetlands within the Waitaki catchment.*

This outcome will be achieved via specific objectives through collaboration and co-design with our project partners. Restoration planning will be underpinned by sound technical and scientific advice. The importance of taonga species will be recognised, along with the relationship between conservation and land-use value and the intersection between the two.

THE DEPARTMENT'S APPROACH

We will describe an aspirational but achievable picture of what the Waitaki Catchment, where linked to braided rivers and their environs, could look like in the long term. This picture is broken down into two sub-contexts: the upper and lower catchments. The upper catchment has two parts: an 'impacted' braided river and environs perspective, and a 'non-impacted' braided river and environs natural state perspective.

We will then specifically define the value set we are seeking to conserve, focusing on ecological values, including the protection, enhancement and restoration of ecological function, habitat protection and management of sensitive species populations. We will enter into detailed negotiations around staging and the range of work needed to achieve outcomes across the following:

- Lake margins
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- Seepages
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- Drylands via connectivity
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OPPORTUNITIES AND LIMITATIONS

There are values we will seek to provide for that are known to contribute to net conservation gain (i.e. they are biodiversity positive). For example, thriving populations of taonga or iconic species, or management of threatened or at-risk species to ensure no further loss (until they can thrive within their ecosystems).

We also recognize that there are areas where the impacts of the scheme, or the effectiveness of mitigating management actions are still not fully understood. For example, impacts on invertebrates or the long-term impacts of climate change. We recognize there will be opportunities to jointly address these knowledge gaps, and to adapt our management approach to incorporate new understanding.

And we acknowledge there are things we cannot restore, e.g., the natural flow of the river.

[1] At negotiation meeting No 2 held on 15 March 2022.

Commented [CO8]: I still think mitigating impacts of the scheme (and using that terminology) needs to feature somewhere early in this document; otherwise it seems like we are not really acknowledging up-front the massive ecological impacts of the scheme

Commented [KH9R8]: Covered in the preamble already

Commented [JM10]: Kens point about Ngai Tahu – may use the term biodiversity positive, and could we test that?

Commented [KH11R10]: See my suggestion

OUR VISION FOR THE WAITAKI CATCHMENT

The Waitaki catchment from a water-related conservation perspective – the big picture

The Waitaki catchment can be managed in an integrated way to deliver nature conservation value across the system.

Lower catchment

In the lower Waitaki we are working at scale to deliver a partially functioning ecosystem. Large islands have been cleared of weeds, subject to effective predator control, and are supporting significant populations of native birds. Side streams and wetlands are restored supporting native fish and birdlife; and the hapua is being managed to restore wetland vegetation and improved mahinga kai. Overall, the key components of the system are thriving through active management.

Upper catchment

We envisage thriving biodiversity in the ~~a vibrant~~ upper catchment, above the storage lakes; management interventions in the non-impacted rivers are delivering biodiversity returns at a scale that substantially mitigates damage to the rivers that remain impacted by lake level management. We are working ~~at~~ large scale, staging and learning as we go.

We are intervening in the impacted Tekapo, Ohau and Pukaki rivers and environs to protect key species (including native fish and terrestrial invertebrates), while recognising the limits of this work due to operation of the scheme.

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It is possible to achieve a partially functioning ecosystem on the Lower Waitaki while acknowledging and accepting the constraints imposed by the existing energy production system.

We envisage a braid plain and associated wetlands (including some outside of the immediate plain, and some around the hapua) where key bird species are thriving; for example, black-fronted tern and wrybill on large cleared islands and substantive sections of riverbed, and Australasian bittern in associated wetlands. Native fish habitat and abundance is greatly improved, both for migratory species such as tuna and lamprey, and non-migratory species such as torrentfish and Canterbury mudfish.

In the short term, this work will involve weed clearance and wetland enhancement, as well as predator control in some places. We see this work occurring at a landscape scale, but highly cost effectively. We believe that with the tools we currently have available, significant results can be achieved within a decade. As we proceed, we will learn more and be able to deliver more cost effectively.

Some of this work will also have benefits to other parties; for example, braid plain weed clearance will benefit flood control.

We acknowledge there are some values that we do not currently have the knowledge to restore.

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In the Upper Catchment above Lake Benmore we envisage ~~a~~ managed functioning braided rivers and environs ecosystems above the existing storage lakes with very high nature conservation values. Below the storage lakes (Tekapo, Pukaki, Ohau) we envisage protected and partially mitigated ecosystems, with a focus on protecting what remains.

Commented [DN12]: Including the Hakataramea?

Commented [KH13R12]: Good question - I'm happy to promote. Can we get cost effective biodiversity conservation in that trib

Commented [CO14]: That could mean anything!!

Commented [KH15R14]: I've changed

Commented [JM16]: Ken how do we define upper and lower, is it above / below Lake Benmore. If so we should be more specific.

Commented [KH17R16]: I'm not sure because there are values in and around the lakes. See what people say today!

Commented [DN18R16]: Yeah maybe we should use Waitaki Dam as the boundary.

Commented [KH19R16]: Lets discuss at the meeting

Commented [CO20]: Does everyone understand what we mean by this - I understand it as landscape scale (not small scale!)

Commented [KH21R20]: I think large is better than landscape - 9(2)(g)(i) [redacted]

Commented [DN22]: Depending on decision about the boundary between upper and lower

Commented [KH23R22]: Yep

Commented [DN24]: Need to fit Ahuriri into this description as it still has very high values, particularly in the upper valley

Commented [KH25R24]: See below, I hope!

We will take a staged approach to achieving this desired future state.

Stage 1 will have six elements:

1. In the Tekapo, Ohau and Pukaki River reaches, which have reduced inflows, we will initially secure populations of species that are vulnerable to extinction. We will prevent the further deterioration of habitat, so that those species and their habitats will be available for future recovery. Securing these populations will include key actions such as predator and weed management, weir construction, management of disturbance, and reduction in abiotic pressures. This may include altering flow regimes based on information learned in point 5 below.
2. In the lower reaches of the Tekapo, Ohau and Ahuriri, and in wetlands, we will initially improve habitat quality across the braid plain to partially replace riverine and wetland habitat lost under Benmore and Ruataniwha Lakes. This will start with a focus on woody and tall herbaceous weeds.
3. To compensate for lost habitat under Lakes Pukaki and Tekapo, and to recognise that lower rivers cannot be fully insulated from ongoing hydro impacts, we will continue with the PRR approach of protecting and enhancing values in the upper catchments. We will undertake targeted weed and predator management in the Tasman, Godley, Cass, MacAulay, Hopkins, Dobson, and ~~Upper~~ Ahuriri ~~Rivers~~rivers and in the smaller foothills fed streams such as the Twizel, Edwards, Grays Irishman~~s~~ Forks, Fraser, Omarama Otamatapaio and Henburn.
4. For some existing values, we have limited understanding of their ecology, distribution, and health. Without attention, these values will likely be lost, particularly where key pressures are high. Before we can decide what actions are required, we need to fill knowledge gaps. We will start this work on terrestrial invertebrate diversity, population status and distribution, and on lizard and freshwater fish population status, in selected habitats across the catchment.
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6. In some wetlands, seepages and side streams, habitat has been irretrievable or substantively lost within the hydro-scheme footprint. For these sites we will seek out alternatives within the wider catchment area that substitute for but will not replace the lost habitat. In those sites we will secure the long-term legal protection of values and manage pressures that erode those values.

Stage 2 and beyond will be built on the activities and knowledge gained in Stage 1. We will scale up the enhancement of values to meet the desired future state – thriving and functioning species and ecosystems at levels that adequately reflect the values that were lost.

Commented [KH26]: 9(2)(g)(i) [redacted]

Commented [DN27]: Both of these have important non-migratory fish values needing weed control

Commented [KH28R27]: OK, noting these are examples!

Reconsenting Waitaki Power Scheme pre-consultation
Initial DOC picture of a biodiversity rich Waitaki

22 March 2022

INTENT:
The parties (the Department of Conservation, Meridian Energy and Genesis Energy) will work towards an agreement over the next two months that will exceed any likely outcome from the resource consenting process (including the Environment Court).

The parties:

- acknowledge that the construction and ongoing operation of the first hydro-electric dam (operating from 1934) and subsequent developments have led to significant alteration to ecosystem processes and to overall environmental degradation, including for indigenous biodiversity. We recognise that there have also been some gains.
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From: Jo Macpherson
To: Ken Hughey
Subject: Initial DOC picture of a biodiversity rich Waitaki - DOC-6954880
Date: Tuesday, 22 March 2022 3:29:07 pm
Attachments: Initial DOC picture of a biodiversity rich Waitaki - DOC-6954880.docx

---

Ken, I am ready to send this through now, added in the title you suggested into the document.
Do you want another quick scan?
I will send at 4pm.
Thanks JO

From:	Colin O"Donnell
To:	Ken Hughey; Dean Nelson
Cc:	Richard Maloney; Alexander Macdonald; Jo Macpherson
Subject:	RE: Meridian Genesis preconsultation Waitaki - DOC-6951050 (002)
Date:	Tuesday, 22 March 2022 9:28:14 am
Attachments:	Meridian Genesis preconsultation Waitaki - DOC-6951050 (002) Dean+ Colin comments.docx

I have added a few comments to the version Dean sent around (attached)
Cheers
Colin

From: Ken Hughey <khughey@doc.govt.nz>
Sent: Tuesday, 22 March 2022 9:16 am
To: Dean Nelson <dnelson@doc.govt.nz>
Cc: Richard Maloney <rmaloney@doc.govt.nz>; Colin O'Donnell <CODONNELL@doc.govt.nz>; Alexander Macdonald <alemacdonald@doc.govt.nz>; Jo Macpherson <jmacpherson@doc.govt.nz>
Subject: RE: Meridian Genesis preconsultation Waitaki - DOC-6951050 (002)
Thanks Dean – very helpful.
I wonder about the boundary? Thinking:

- Could have a 3rd, middle section, which is essentially the hydro lakes, except of course one beside Twizel!?
- Could have lower boundary at Lake Waitaki
- Could have lower boundary at top of Lake Benmore

My preference is for one of the first two. A 3rd section might be tidy and would be limited. Having the boundary at Lake Waitaki would make the lower Waitaki very clear cut.
Don't know though is my short answer?
Ken

From: Dean Nelson <dnelson@doc.govt.nz>
Sent: Tuesday, 22 March 2022 8:52 am
To: Ken Hughey <khughey@doc.govt.nz>
Cc: Richard Maloney <rmaloney@doc.govt.nz>; Colin O'Donnell <CODONNELL@doc.govt.nz>; Alexander Macdonald <alemacdonald@doc.govt.nz>; Jo Macpherson <jmacpherson@doc.govt.nz>
Subject: RE: Meridian Genesis preconsultation Waitaki - DOC-6951050 (002)
Hi Ken,
Few comments and additions.
Cheers, Dean

From: Ken Hughey <khughey@doc.govt.nz>
Sent: Monday, 21 March 2022 12:02 pm
To: Richard Maloney <rmaloney@doc.govt.nz>; Colin O'Donnell <CODONNELL@doc.govt.nz>; Alexander Macdonald <alemacdonald@doc.govt.nz>; Dean Nelson <dnelson@doc.govt.nz>
Cc: Jo Macpherson <jmacpherson@doc.govt.nz>
Subject: Meridian Genesis preconsultation Waitaki - DOC-6951050 (002)
Guys – next iteration. Want to present and discuss something like this with the generators. Our urgent comments please, by cop or first thing tomorrow as planning to send so they can read prior to our next meeting on Thursday.
Also thinking about our ability to scale and what that might look like and range from and to? Thinking about minimum viable product (being something like the conservation return cf investment) vs the realistically maximum viable product as the scale if that makes sense. And I

want to make sure we see the big picture here, e.g., on the lower Waitaki if we want a clear fairway policy then [redacted] become a big player but the generators play a part. If no [redacted] then how much would we want [redacted] to do being the minimum viable product. Anyway – this is me thinking aloud.
Thanks Ken

From:	Dean Nelson
To:	Ken Hughey
Cc:	Richard Maloney; Colin O"Donnell; Alexander Macdonald; Jo Macpherson
Subject:	RE: Meridian Genesis preconsultation Waitaki - DOC-6951050 (002)
Date:	Tuesday, 22 March 2022 8:52:45 am
Attachments:	Meridian Genesis preconsultation Waitaki - DOC-6951050 (002).docx

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Cheers, Dean

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Sent: Monday, 21 March 2022 12:02 pm
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Thanks Ken

From: Jo Macpherson
To: Ken Hughey
Cc: Melanie Lynskey
Subject: RE: Update on sales pitch
Date: Monday, 21 March 2022 10:35:22 am
Attachments: Meridian Genesis preconsultation Waitaki - DOC-6951050.docx

Morning Ken
In response to your points below:

1. I think its pretty close and ready to go out. Ken will you send this to your small sub-group? (Richard, Alex, Colin & Dean) Let me know if you want me to send it to them.
2. By clear fairway down the middle do you mean islands with weed control starting with woody and herbaceous weeds? I think in relation to point 2 below, is it not covered in the vision statements? I think it probably is, although, we don't directly refer to working 9(2)(j) [redacted]

I have up-dated the master document with your comments from Friday. (Latest version attached above) I have popped in a couple of comments too.
https://doccm.doc.govt.nz/wcc/faces/wccdoc?dDocName=DOC-6951050
Cheers Jo

From: Ken Hughey <khughey@doc.govt.nz>
Sent: 21 March 2022 09:17
To: Jo Macpherson <jmacpherson@doc.govt.nz>; Melanie Lynskey <mlynskey@doc.govt.nz>
Subject: Update on sales pitch
Morena Jo and Mel
Few things:

1. Keen to get this out to the science advice support this morning if possible so we can finalise and get to generators b tomorrow

I was thinking again over the weekend and thinking big picture.

2. For example on the lower Waitaki what we actually want is a clear fairway down the middle of the river with predator control in appropriate places, complemented by riparian margin wetland management. The former in particular, unless [redacted] volunteers a lot of money, should probably be a team effort, i.e. 9(2)(j) [redacted]

Ken

From: Jo Macpherson
To: Ken Hughey
Cc: Melanie Lynskey
Subject: Meridian Genesis preconsultation Waitaki - DOC-6951050
Date: Thursday, 17 March 2022 2:00:22 pm
Attachments: Meridian Genesis preconsultation Waitaki - DOC-6951050.docx
Meridian Genesis preconsultation Waitaki - DOC-6951050.docx

Ken
Mel has done her magic!! I have attached a clean version for your review, and one with track changes so you can see what Mel has done.
I suggest you go the clean version first for a fresh read.
I will also review the clean copy too and let you know what I think..
A lot of the work Mel did was around sentence structure etc..
Mel, Ken has troubles in AWS to sending attachments. Thanks so much you are a natural!
Ken if you make any changes you might be best to put track changes onto the clean version perhaps – or highlight them in another colour.
Cheers JO

From:	Richard Maloney
To:	Ken Hughey
Cc:	Dean Nelson; Alexander Macdonald; Colin O"Donnell
Subject:	Upper Waitaki catchment values and outcomes related to hydro-scheme impacts_ver2 - DOC-6947134
Date:	Monday, 14 March 2022 1:22:25 pm
Attachments:	Upper Waitaki catchment values and outcomes related to hydro-scheme impacts_ver2 - DOC-6947134.docx

Hi Ken

As requested on Friday – here's a go at describing all of the work around values within the Upper Waitaki part of the scheme. Dean has commented, but not Alex or Colin.

It's a 1 pager, though you could use paragraph 2 (the objective statement/future state) and the last bulleted section (the examples of work) as a stand-alone - if you have referenced the context sections elsewhere.

We are happy to discuss further if this isn't what you had in mind.

Cheers

Richard

Enhancing, restoring, and replacing ecological values impacted by hydro-electric development and use in the Upper Waitaki catchment

Hydro-generation has had wide-reaching impacts on species and ecological communities and their connections in the Upper Waitaki. These include direct loss of habitats and species, including loss of community function, loss of connectivity and changed barrier effects, flow-on impacts (e.g., dewatering making river islands accessible to predators and increasing weeds), cumulative impacts (e.g., loss of side bank erosion and sediment transport reduces future river island building capacity), loss of resilience to present and future stressors (e.g., less able to cope with climate change impacts, less resilience to invasive weeds and predators etc).

The desired future state is that the populations of species, communities, habitats, and ecosystems that have been impacted by the hydro-development scheme are thriving and functioning in the Upper Waitaki Catchment at levels that mirror or improve on those that were lost.

Mitigating these impacts will include a range of activities at a range of scales to protect and enhance values that still exist, and to partially offset those that have been irretrievably lost. For some values, the true level of impact of hydro-generation is unclear, for some values the actions to reverse losses are not well understood, and for yet others, actions are available and are ready to implement.

In the Upper Catchment above Lake Benmore, we will take a staged approach to achieving the future state. Stage 1 will have six elements:

(1) In the Tekapo, Ohau and Pukaki River reaches which have reduced inflows, we will initially secure populations of species that are vulnerable to extinction, and prevent the further deterioration of habitat, so that those species and habitat will be available for future recovery. Securing populations include key actions such as predator and weed management, weir construction, management of disturbance, and reduction in abiotic pressures. This may include altering flow regimes based on information learned in point 5 below.

(2) In the lower reaches of the Tekapo, Ohau and Ahuriri, and in wetlands, we will initially improve habitat quality across the braid plain to partially replace riverine and wetland habitat lost under Benmore and Ruataniwha Lakes. This will start with a focus on woody and tall herbaceous weeds.

(3) To compensate for lost habitat under Lakes Pukaki and Tekapo, and to recognise that lower rivers cannot be fully insulated from ongoing hydro impacts we will continue with the PRR approach of protecting and enhancing values in the upper catchments through targeted weed and predator management – i.e., in the Tasman, Godley, Cass, MacAulay, Hopkins, Dobson, and Upper Ahuriri Rivers, and in the smaller foothills feed streams (e.g., Twizel, Edwards, Grays, Irishman's, Forks, Fraser, Henburn etc).

(4) For some existing values, we have limited understanding of their ecology, distribution, and health. Without attention, these values will likely be lost, particularly where key pressures are high. Before we can decide what actions are required, we need to fill knowledge gaps. We will start this work on terrestrial invertebrate diversity, population status and distribution, and on lizard and freshwater fish population status, in selected habitats across the catchment.

(5) For species and habitat values for which we do not have appropriate or affordable tools to mitigate key pressures, we will take an adaptive management approach to develop and hone methods before their wider application. This will include an initial focus on pressure management tools, restoration tools, and understanding flow regime options to better protect and enhance values.

(6) In some wetlands, seepages and side streams, habitat has been irretrievable or substantively lost within the hydro-scheme footprint. For these sites we will seek out alternatives within the wider catchment area that substitute for but will not replace the lost habitat. In those sites we will secure the long-term legal protection of values and manage pressures that erode those values.

Stage 2 and beyond will built on the activities and knowledge gained in Stage 1 and scale up the enhancement of values to meet the desired future state – thriving and functioning species and ecosystems at levels that adequately reflect the values that were lost.

From:	Jo Macpherson
To:	Ken Hughey; Debby Drummond
Subject:	FW: 15.30 Meridian and Genesis meeting tomorrow - is there anything for Mike to prepare with - any papers to read:)
Date:	Tuesday, 8 March 2022 3:12:41 pm
Attachments:	Outcome + principles + approach + high level picture of LW - 3 Mar 22.docx

Hi Ken

Debby is checking in about what material she needs to give to Mike for pre-reading for tomorrow. Have you done some more work on the attachment. I am happy to save it into the system at any point when you are OK for me to do that too.

It would be good to give Mike a heads up of the risks which we are aware of as well, so I'll pull out what I have seen so far and send to you Ken. Perhaps we send an up-dated version of the doco above, to Mike, with a cover e-mail identifying some key risks he needs to be aware of prior to the meet. We would need to do this in the next hour really if we can.

Debby, I wonder too whether we can have Mike join Ken and I at least 15 minutes pr or to our [redacted] meet tomorrow, and we can talk through our plan for the meet, would this work, we can just go onto the same link as the meeting at 3-30 pm, but it would be good if the three of us could join by 3-15 if possible,

Cheers Jo

From: Debby Drummond <ddrummond@doc.govt.nz>
Sent: 08 March 2022 14:02
To: Jo Macpherson <jmacpherson@doc.govt.nz>
Subject: 15.30 Meridian and Genesis meeting tomorrow - is there anything for Mike to prepare with - any papers to read:)

From:	Christopher Rendall
To:	Ken Hughey; Jo Macpherson; Richard Maloney; Colin O"Donnell; Alexander Macdonald; Karina Morrow; Dean Nelson; Hughey, Kenneth
Cc:	Susan Newell
Subject:	MŌ: My VERY rough notes
Date:	Thursday, 3 March 2022 1:43:06 pm
Attachments:	Values based discussion Waitaki - starter for 5 - lower Waitaki example_CR.docx

Kia ora

Given timeframe I have the following as context to support your chat with Mike:

- 9 (2) (h)
- [redacted]
- [redacted]
- [redacted]
- [redacted]
  - [redacted]
- [redacted]
- [redacted]
  - [redacted]
  - [redacted]
- [redacted]
- [redacted]
- [redacted]

[redacted].

Cheers

Chris

Mai: Ken Hughey <khughey@doc.govt.nz>

I Tukua: Thursday, 3 March 2022 11:55 am
Ki: Jo Macpherson <jmacpherson@doc.govt.nz>; Richard Maloney <rmaloney@doc.govt.nz>; Colin O'Donnell <CODONNELL@doc.govt.nz>; Alexander Macdonald <alemacdonald@doc.govt.nz>; Christopher Rendall <crendall@doc.govt.nz>; Karina Morrow <kmorrow@doc.govt.nz>; Dean Nelson <dnelson@doc.govt.nz>; Hughey, Kenneth <[redacted]
Marau: RE: My VERY rough notes
Huge thanks and onto it. Re Alex's first point – people have not seen this, and neither has Mike but I think it will be covered! We can assure such at meeting with Mike

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From: Jo Macpherson <jmacpherson@doc.govt.nz>
Sent: Thursday, 3 March 2022 11:54 am
To: Ken Hughey <khughey@doc.govt.nz>; Richard Maloney <rmaloney@doc.govt.nz>; Colin O'Donnell <CODONNELL@doc.govt.nz>; Alexander Macdonald <alemacdonald@doc.govt.nz>; Christopher Rendall <crendall@doc.govt.nz>; Karina Morrow <kmorrow@doc.govt.nz>; Dean Nelson <dnelson@doc.govt.nz>; Hughey, Kenneth <[redacted]
Subject: My VERY rough notes
Alex – need to be clear on governance and decision making process (not sure if the draft memo will cover all of this off)
How we have invested in the past, learnt a lot - we are now well poised and ready to get moving on developing healthy functioning eco-systems
List of full range of different areas: (Richard to confirm)

1. Lake margins
2. Wetland areas
3. Braided rivers
4. Deltas
5. Seepages
6. Drylands connectivity
7. Connectivity through river systems

Risk work – Chris to forward the risk work from Susan Newell
Set scene at the start of the meet – that since 1926 from its instigation, significant impact has occurred – all parties need to acknowledge that
Lower Waitaki
R- if talking lower W peripheral benefits – ie: islands bulldozed will result in less herbicide into the environ.
Some of the detailed aspirations and where some of the trade-offs might exist
What is an aspirational picture for native fish? Alex – functioning braid plan ecosystem, having a braid play less constrained, more dynamic, help sides, wetlands seeps etc. Would have trade-offs and not immune to those. F&G strong interest, nom-migratory in side stream. Bunch of values we can work on.
C – to have a functioning ecosystem need connectivity which we will never get to.
C – bit uncomfortable clearing islands for birds. But what's the impact of that on aquatic vertebrates on the wetted edges, spraying, keep mentioning terrestrial vertebrates and lizards, but if forever root raking islands, then don't really know. Think system than individual components.
A – what effects do flow effects have on various species?
Ken – we have good ideas already for the lower Waitaki.
Even with best attempt – we will only have a marginally functioning eco-system, with bits functioning well.

R – that's fine – aspiration is we land learnt a lot, time to scale it up, focusing on dynamic nature of system and allow to thrive , exemplar versions in 10 years. Focus on iconic and sensitive species thriving independent of how they are functioning in the system, ie: BF Tern or fish, and popn thriving. Step wise approach, multi-faceted, across all of those various things, some is in research phase, side effects of the management actions, and a learning approach. Will lead to some habitat from getting much worse, some will improve, and some we will ger close to a natural state – acknowledging the 35 year context.
A – framing at higher level – set up, sets us to have the more detailed discussions without constraining us.
Cheers JO

From: Alexander Macdonald
To: Colin O"Donnell; Richard Maloney; Ken Hughey
Subject: RE: Outcome + principles + approach + high level picture of LW - 3 Mar 22.docx
Date: Thursday, 3 March 2022 1:01:49 pm
Attachments: Outcome + principles + approach + high level picture of LW - 3 Mar 22_RM_AM comments.docx

Kia ora – unfortunately colin beat me too it but I have now added my comments (and Colins too)
Thanks
A

Alex Macdonald
Acting Manager, Freshwater (Species) Ph: 9(2)(a)
Aquatic
Department of Conservation | Te Papa Atawhai

From: Colin O'Donnell <CODONNELL@doc.govt.nz>
Sent: Thursday, 3 March 2022 12:56 pm
To: Richard Maloney <rmaloney@doc.govt.nz>; Ken Hughey <khughey@doc.govt.nz>; Alexander Macdonald <alemacdonald@doc.govt.nz>
Subject: RE: Outcome + principles + approach + high level picture of LW - 3 Mar 22.docx
I have added a few comments to Richards version….

From: Richard Maloney <rmaloney@doc.govt.nz>
Sent: Thursday, 3 March 2022 12:43 pm
To: Ken Hughey <khughey@doc.govt.nz>; Alexander Macdonald <alemacdonald@doc.govt.nz>; Colin O'Donnell <CODONNELL@doc.govt.nz>
Subject: FW: Outcome + principles + approach + high level picture of LW - 3 Mar 22.docx
Hi all
Comments tracked in this version.
R

From: Hughey, Kenneth <[redacted]
Sent: Thursday, 3 March 2022 12:29 pm
To: Richard Maloney <rmaloney@doc.govt.nz>; Colin O'Donnell <CODONNELL@doc.govt.nz>; Alexander Macdonald <alemacdonald@doc.govt.nz>
Cc: Jo Macpherson <jmacpherson@doc.govt.nz>; Ken Hughey <khughey@doc.govt.nz>
Subject: Outcome + principles + approach + high level picture of LW - 3 Mar 22.docx
Starter for 6
Reminder Jo and I are meeting 2pm with MS
Thanks again – no idea if I have it right but was listening carefully, or at least trying to do so
Ken

From: Colin O"Donnell
To: Richard Maloney; Ken Hughey; Alexander Macdonald
Subject: RE: Outcome + principles + approach + high level picture of LW - 3 Mar 22.docx
Date: Thursday, 3 March 2022 12:56:35 pm
Attachments: Outcome + principles + approach + high level picture of LW - 3 Mar 22_RM_Plus COD.docx

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I have added a few comments to Richards version….

From: Richard Maloney <rmaloney@doc.govt.nz>
Sent: Thursday, 3 March 2022 12:43 pm
To: Ken Hughey <khughey@doc.govt.nz>; Alexander Macdonald <alemacdonald@doc.govt.nz>; Colin O'Donnell <CODONNELL@doc.govt.nz>
Subject: FW: Outcome + principles + approach + high level picture of LW - 3 Mar 22.docx

Hi all

Comments tracked in this version.

R

From: Hughey, Kenneth <9 (2)(a)
Sent: Thursday, 3 March 2022 12:29 pm
To: Richard Maloney <rmaloney@doc.govt.nz>; Colin O'Donnell <CODONNELL@doc.govt.nz>; Alexander Macdonald <alemacdonald@doc.govt.nz>
Cc: Jo Macpherson <jmacpherson@doc.govt.nz>; Ken Hughey <khughey@doc.govt.nz>
Subject: Outcome + principles + approach + high level picture of LW - 3 Mar 22.docx

Starter for 6

Reminder Jo and I are meeting 2pm with MS

Thanks again – no idea if I have it right but was listening carefully, or at least trying to do so

Ken

From: Richard Maloney
To: Ken Hughey; Alexander Macdonald; Colin O"Donnell
Subject: FW: Outcome + principles + approach + high level picture of LW - 3 Mar 22.docx
Date: Thursday, 3 March 2022 12:43:42 pm
Attachments: Outcome + principles + approach + high level picture of LW - 3 Mar 22_RM .docx

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Hi all

Comments tracked in this version.

R

From: Hughey, Kenneth <Ken.Hughey@lincoln.ac.nz>
Sent: Thursday, 3 March 2022 12:29 pm
To: Richard Maloney <rmaloney@doc.govt.nz>; Colin O'Donnell <CODONNELL@doc.govt.nz>; Alexander Macdonald <alemacdonald@doc.govt.nz>
Cc: Jo Macpherson <jmacpherson@doc.govt.nz>; Ken Hughey <khughey@doc.govt.nz>
Subject: Outcome + principles + approach + high level picture of LW - 3 Mar 22.docx

Starter for 6

Reminder Jo and I are meeting 2pm with MS

Thanks again – no idea if I have it right but was listening carefully, or at least trying to do so

Ken

From: Jo Macpherson
To: Ken Hughey
Subject: Our approach position draft 1 - 1 March 2022
Date: Tuesday, 1 March 2022 3:42:16 pm
Attachments: Our approach position draft 1 - 1 March 2022.docx

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Ken, you did a really good job. I compared it with my notes, and you picked up on all the bits I highlighted, and much more, so great. I made a few comments in the attached FYI.
B+
Thanks Jo

From: Christopher Rendall
To: Ken Hughey; Jo Macpherson
Cc: Hughey, Kenneth
Subject: MŌ: HEPS 1 hour meeting tomorrow & Thursday
Date: Monday, 28 February 2022 2:41:02 pm

Looks good.
A table from the Lewis and Maloney paper could potentially be a starting point DOC-6770902 it also identifies the actions required so much of this would just be a reworking of that info. Colin's paper started to explore how actions could be focussed - DOC-6779452
9 (2) (h) [redacted] 9 (2) (h) [redacted]
Cheers
Chris

Mai: Ken Hughey <khughey@doc.govt.nz>
I Tukua: Monday, 28 February 2022 2:00 pm
Ki: Jo Macpherson <jmacpherson@doc.govt.nz>
P: Christopher Rendall <crendall@doc.govt.nz>; Hughey, Kenneth <9(2) (a) [redacted]
Marau: RE: HEPS 1 hour meeting tomorrow & Thursday
9 (2) (g) (i) [redacted]
So, re approach - Ok, I think. Massive responsibility however and assumes of course that the meeting Wed week with the generators is successful. So, proceeding on that basis:

1. Remind people of context and that next week is yet to occur
2. Cover where we got to on Friday re outcome and principles
3. Propose a purpose for this week of: developing a brief overview of realistic 'deliverables' that over time would achieve the overall (desired and agreed) outcome of the 'whatever we are calling it' project
4. We need to be clear on the value set we are seeking to protect, enhance and/or restore. My pick is that it will be presented both generally but also with specific examples, as perhaps suggested below
5. To achieve the above we need to be clear on what 'without' (effectively the impacted (from HEP) river and environs system values) and 'with' (the gains) management intervention delivers (the gap is the payoff), and how it was delivered (that requires investment):
    a. Braided rivers and environs generally, e.g., Lower Ahuriri – without: 'weed' (willow and lupin especially) infested changing river to a 'stable' braided river???; with: 'natural' habitat retained which delivers multiple benefits including for birdlife and terrestrial insects; means: cost effective and ongoing weed control programme
    b. Braided rivers and environs generally, e.g., Lower Waitaki – without: 'weed' (willow and lupin especially) infested changing river to a 'stable' braided river with very negative impacts on native birdlife in particular; with: 'natural' habitat retained which delivers multiple benefits including for birdlife and terrestrial insects; means: cost effective and ongoing weed control programme on a carefully selected set of large islands

c. Native fish, e.g., Tuna – without: no recruitment above Lake Waitaki but viable fishery below; with: viable upper Waitaki fishery; Means: recruitment to the upper Waitaki by artificial means, e.g., catch and release
d. Terrestrial invertebrates, e.g., robust grasshopper – without: extinction due to predation on river flats; with: conservation of species; Means: ongoing predator control overlapping with other species
e. Braided river birds, e.g., wrybill – without: ???; with: conservation of species alongside others; Means: ??? effective weed control
f. ???

I think some thing like this, much better presented, could deliver a tangible starting point??
This is just an idea and one done in a hurry (have further Mercury meeting this pm)!!
Thoughts? You will note I have not attempt to id a dollar value, yet. Form follows function and lets leave that for a bit, maybe later in the week!?
Ken

From: Jo Macpherson <jmacpherson@doc.govt.nz>
Sent: Monday, 28 February 2022 11:03 am
To: Ken Hughey <khughey@doc.govt.nz>
Cc: Christopher Rendall <crendall@doc.govt.nz>
Subject: HEPS 1 hour meeting tomorrow & Thursday

Hi Ken
I think for these two internal meetings with the project team, its best that you lead – is that OK, as Mike summed up roles quite well last week:

- Ken - will be the lead for developing the technical package that we will take into any negotiations.
- Ken will lead negotiations, supported by Jo and the internal working group.
- Jo will provide the ongoing Management lead for this process (including maintaining this lead after a new Regional director is appointed.)

We should make the team aware of what we agreed re roles.
We will need to think through what we need to get out of tomorrow, but am sure you are already thing this through..
I'm happy to put an agend together and send out, but need to be guided by you on content.
Chris FYI its looking like the high level meeting will occur next Wednesday afternoon, which is great. Its just getting locked in now. Ken, Mike and I will be present, along with 9 (2) (a) [redacted] (for Genesis), and 9 (2) (a) [redacted] for Meridian.
Cheers Jo

From: Richard Maloney
To: Ken Hughey
Subject: RE: Hi Richard - doing some work for Mike Slater on Waitaki in cooperation with Nic and Jo and ...
Date: Thursday, 17 February 2022 10:41:06 am
Attachments: PRR costing report - DOC-6277160.pdf

Hi Ken
Here's the proper DOCCM number for this one.
Happy to talk to this at any stage.
Assume you are in touch with Christopher Rendall who has been working up the story for the Waitaki meridian/genesis consent – including which costs/overheads etc.
Cheers
Richard

From: Ken Hughey <khughey@doc.govt.nz>
Sent: Thursday, 17 February 2022 10:29 am
To: Richard Maloney <rmaloney@doc.govt.nz>
Subject: Hi Richard - doing some work for Mike Slater on Waitaki in cooperation with Nic and Jo and ...
And can't access Lewis and Maloney 2020; DOC-6770902 via Oracle. Can you pse email me a copy?
Hope all is well?
Ken

From: Michael Slater
To: Ken Hughey; Jo Macpherson
Subject: Fwd: Genesis / Meridian - DOC summary of Project River Recovery PRR
Date: Tuesday, 15 February 2022 6:55:59 am

Hi Ken
Here is some information that Jo has sent me-very helpful in setting out current understanding but does little to describe current impact of the power scheme,and therefore how all these elements link together,what is appropriate in the context of the current consent application (and how any mitigation the power companies are advocating are integrated)and most importantly given all of above what our strategy for negotiation should be.
9 (2) (g) (i) [redacted]
We need a discussion on this as soon as possible.
Cheers Mike

Sent from Workspace ONE Boxer

---------- Forwarded message ----------
From: Jo Macpherson <jmacpherson@doc.govt.nz>
Date: 12/02/2022 5:00 pm
Subject: Genesis / Meridian - DOC summary of Project River Recovery PRR
To: Michael Slater <mslater@doc.govt.nz>
Cc:

> Hi Mike
> Following on from your comments this week...
> I have had a read of a document which is in draft form currently circulating amongst the DOC team working on the Meridian / Genesis negotiations.
> I understand they are wanting to send this to the 'Generators' prior to the meeting next week.
> I assume the 'Generators' are the Meridian & Genesis representatives, or perhaps they are the other reps from [redacted] / [redacted] I'm not sure as I am still building the context.
> Anyway, I have reviewed it and put in a heap of comments. I was thinking that if this was to go external then we need to sharpen it a lot more, my comments reflect this.
> I haven't yet read through the appendices, but will do.
> Noting your conversation last week I wanted to give you some visibility over this. Do you think this is a big risk? If you do then, perhaps we should delay the meeting. I agree that there is value in reviewing the PRR programme, but we need to be very careful how we articulate it so we don't start negotiations off on the wrong foot.
> My plan (after I hear back from you) will be to send it back to the team with my comments, and suggest some next steps. I'll also arrange a meeting with Chris Rendall for Monday or Tue next week to discuss.
> Thanks JO