Arthur Marble Recharge Zone – recap and review

8 July 2016

tasman district council

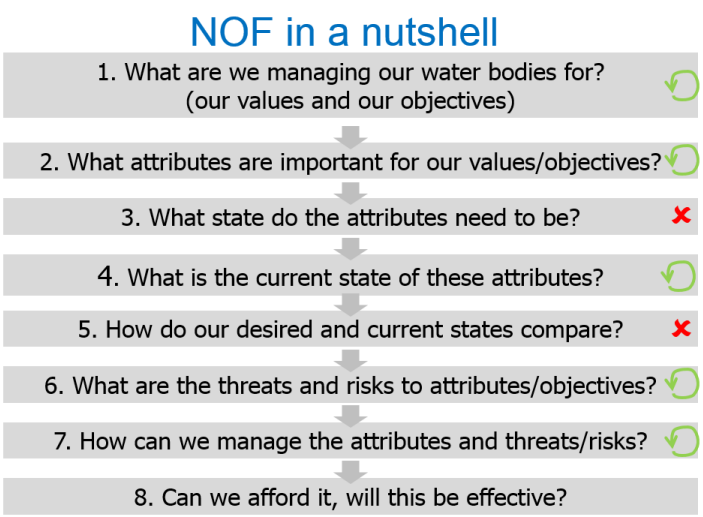
Outline of AMA (TWS) recap and review:

- Have we got the values and management objectives right?
- Have we identified all the key attributes?
- What are the current and desired states for these attributes?
- Are we in a maintain or improve situation?

- What are the threats and risks?

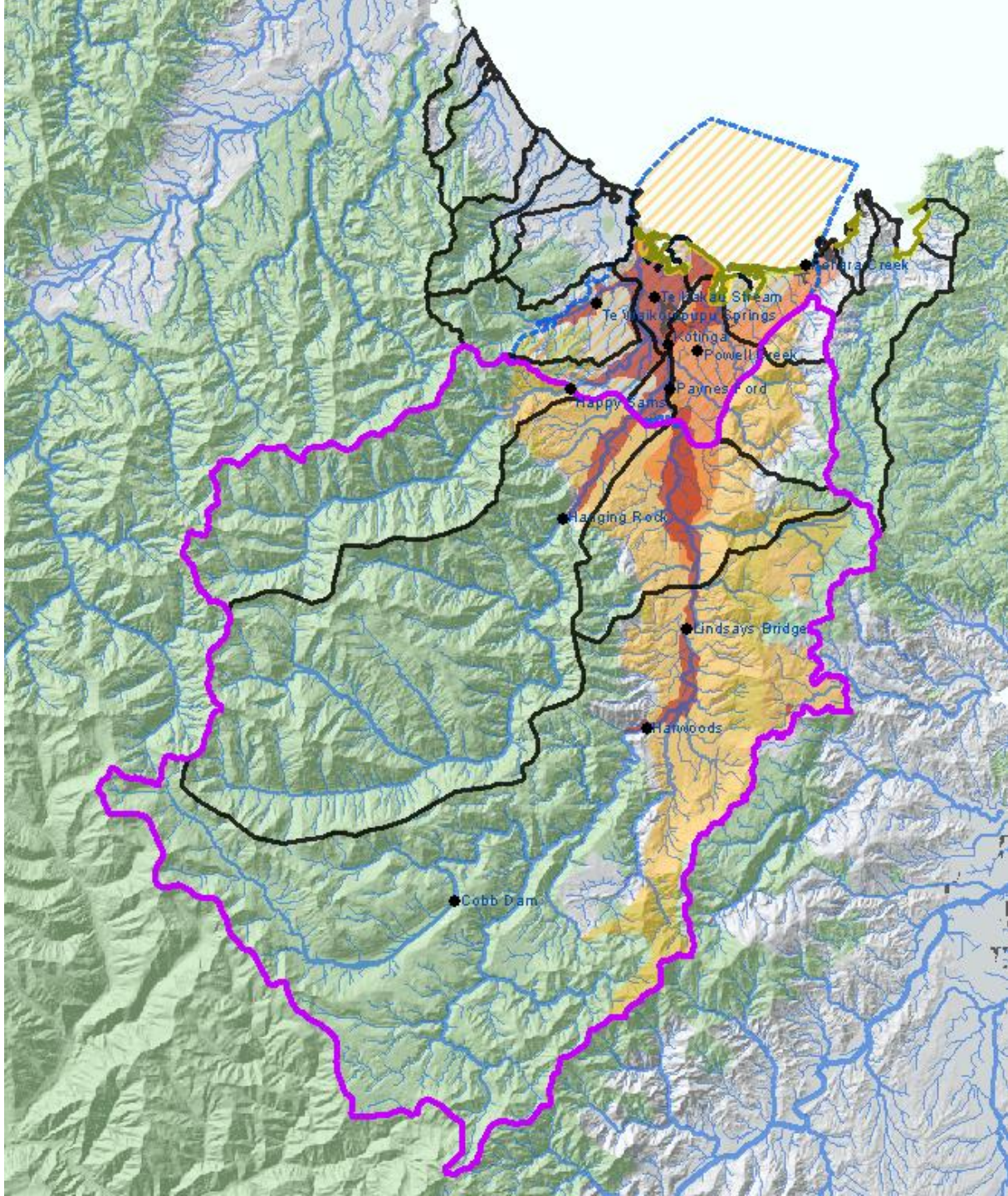
- Review water quality management
- Water quantity management decision

- Full circle – will we meet the management objectives?



Arthur Marble Aquifer Recharge Zone

(Te Waikoropupu Springs)



FMU Values and Management Objectives

Draft May 2015

- Suggest removal of ‘mauri’ from ecosystem health – but retain in cultural/spiritual
  - Mauri has considerations wider than just ecological
    - Ie site has good ecological function, but insufficient fish abundance to allow for manaaki (hospitality etc)
- These management objectives differ from the ‘freshwater objectives’ in the NPS-FM which relate to the attribute states and which still need to be agreed

Values and Management Objectives – AMA+TWS

- The AMA and TWS have healthy mauri and waters are suitable for cultural/spiritual uses & rituals
- TWS (Wahi Tapu) is not degraded by human/animal waste discharges, contaminants and excess sediment
- The valued features, taonga and unique properties of TWS and Fish Creek Springs (Wahi Tapu) are protected
  - Which are? Eg Flowing strongly, water clarity, mauri, kaitiakitanga, community pride, sense of place…?
- Ecosystem health objectives are met (AMA and TWS)
  - flora/fauna diversity
  - minimum requirements for healthy, functioning, resilient aquatic populations,
  - good habitat diversity suitable to aquatic and riparian fauna needs
- There is an acceptable security of supply for water users in the recharge zone
- The AMA has a sufficiently abundant supply to meet ordinary domestic water needs
- Water is suitable for economic and drinking water uses with minimal or no treatment
- Water is used efficiently and quality is maintained or enhanced to meet the needs of future generations
- Natural and physical characteristics of water bodies and water flows and quality from springs are maintained
- Existing Hydro-electric power generation schemes (eg Cobb) are able to continue to generate electricity as needed and existing generation is protected

AMA Recharge area - Key attributes

AMA recharge: Values/Uses Outcomes	**Key Attributes**
• Healthy mauri of aquifer and springs	• TWS flow (representing groundwater levels/pressures) • Mauri [and attributes listed below, plus others if identified by iwi]
• Healthy stygofauna in aquifer (resulting in v.high water clarity)	• Water clarity and dissolved oxygen levels (representing dissolved organic carbon processing in aquifer)
• Avoiding effects in spring-fed waters	• Nitrate, Phosphorus, N:P ratio ('canary' for risk of exacerbating periphyton growth) • TWS flow and surface water minimum flows (representing groundwater recharge and groundwater levels/pressures)
• Maintaining drinking water quality and quantity	• E.coli • TWS flow and surface water minimum flows (representing groundwater recharge and groundwater levels/pressures)
• Enabling economic and livelihood uses of water	• security of supply • social/economic benefits/indicators?? – eg percentage of current business demand met (ie waiting lists)
• Meeting the needs of future generations	• [the above attributes/outcomes?] • Water efficiency?

Te Waikoropupu Springs - Key attributes

TWS: Values/Uses, Outcomes, Characteristics	**Key Attributes**
• Mauri of springs • Iconic, outstanding classification of TWS • Tourism benefits	• Water clarity • TWS flow • Fish Creek Springs flow? • Mauri [and attributes listed below, plus others if identified by iwi]
• Healthy Ecosystems (aquatic plants and animals and habitats)	• Nitrate, Phosphorus, N:P ratio (‘canary’ for risk of exacerbating nuisance plant growth) • Nitrate toxicity • Water clarity (representing aquifer ecosystem health) • Dissolved oxygen (representing aquifer ecosystem health) • Macro-invertebrates • Aquatic plants (macrophytes and periphyton)

AMA Recharge - Key attributes Summary

- TWS flow / Fish Creek Springs minimum flow?
- Mauri
- Water clarity
- Dissolved oxygen
- Nitrate, Phosphorus, N:P ratio (for aquatic plant growth)
- Nitrate (toxicity)
- E.coli
- Surface water minimum flows
- Macro-invertebrates
- Aquatic plants (macrophytes and periphyton)
- Security of supply
- Economic/livelihood indicator?- % of business demand met
- Water efficiency?

Key attributes – current and desired states

Attribute	Current State	Desired State (suggested - TBC)	Status summary (maintain, improve, monitor)
TWS flow Fish creek spring flows?	MALF is 7661 l/s. Median flow is 9940 l/s. Flows show tidal influence. Estimated that MALF increased by Cobb Dam by 790 l/s. No direct protection of minimum flows.	A minimum flow of 90% of main spring MALF = 6895 l/s. Protected by cease take.	Improve (then maintain)
Surface water minimum flows	No cease takes for most consents so no protection of minimum flows.	Cease takes in place for all consumptive consents where abstraction affects minimum flows (excluding domestic and community water supplies).	Improve (then maintain)
Mauri	**Unknown:** Assumed mauri has improved with greater respect given and enhancements made to reserve.	**Unknown** – requires discussion with iwi.	Monitor?
Water clarity	**Unknown:** Last measured (NIWA, 1993) at 63m – one off – no measurement of temporal variability Recent attempts have failed to yield reliable results due to very high clarity. NIWA recommending a specialist transmissometer for at least a year, but funding needed.	**Baseline needed?** **No change** from 1993? (within measurement error margins (2%?) and variability)	Monitor? (obtain baseline)
Dissolved oxygen	**Uncertain:** (change within measurement error margins) 1970's: 58%-65% saturation April-May 2016: 50%-53% - potentially greater variation during peak plant production (ie Feb) – baseline needed?	**Baseline needed?** **No change** (within measurement error margins and variability) = ??% +/-??	Monitor? (obtain baseline)

Key attributes – current and desired states

Attribute	Current State	Desired State (suggested - TBC)	Status summary (maintain, improve, monitor)
Nitrate for aquatic plant growth	1970-2014 median 0.0.37 (range 0.29-0.51)	(science panel advice?)	Maintain? (no increase)
Phosphorus (DRP) for aquatic plant growth	1970-2014 median 0.018 (range 0.002-0.080) Since 2005 range <0.004-0.026	(science panel advice?)	Maintain? (no increase)
Nitrate : Phosphorus ratio for aquatic plant growth	1970-2014 data median N:P ratio = 18:1 70% of ratios suggesting Phosphorus limited.	No change to phosphorus limitation.	Maintain
Nitrate toxicity	2015 'A' grade (NOF) AM=0.38, A95%=0.60 2016 FoGB median = 0.40, 95%=0.40 [last 5 year median= 0.42, 95%=0.49] Nitrate has increased over the 45 year record, but decreased over last 10 years. Due to hardness of water the toxicity of nitrate is lower than for the NOF grades.	Maintain nitrate in A band <1mg/l [this desired state would be superseded if the nitrate for aquatic plant growth state is lower]	Maintain
Macro-invertebrates	No indication of change.	No change attributable to water quality or water abstraction.	Maintain
Aquatic plants	Some changes in area over last 29 years attributed to freshes and low flows, but not attributed to water quality (Stark 2015)	No change attributable to water quality or water abstraction.	Maintain
Temperature	No indication of change.	No change attributable to water quality or water abstraction.	Maintain

Key attributes – current and desired states

Attribute	**Current State**	**Desired State** (suggested - TBC)	**Status summary** (maintain, improve, monitor)
E.coli	[DoC] very low (<5) (but not suitable for drinking water as not <1)	No change.	Maintain
% of business demand (waiting list) for water met	61% (=492ET/ 492ET+312WL)	As high as possible - within sustainable limits? *(implications for Takaka Township zone?)*	Improve?
Security of supply	SoS are currently higher due to limited minimum flow and cease take provisions. (depending on proposed regime) 96.3%-96.9% time above CT 25-19% of years with >3days CT 19% of years with >5 days CT	Maintain SoS at >96% ('B' Grade from WW work) *Maintaining higher SoS may require a reduction in allocation limits.*	Maintain
Water efficiency	?	?	?

AMA Recharge Zone status

- Is there a current problem to be addressed? Or are we in a ‘maintain’ and monitor situation?

Questions?

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AMA accounting

% of surface flows estimated to affect TWS flows

% of water take volumes estimated to affect TWS flows