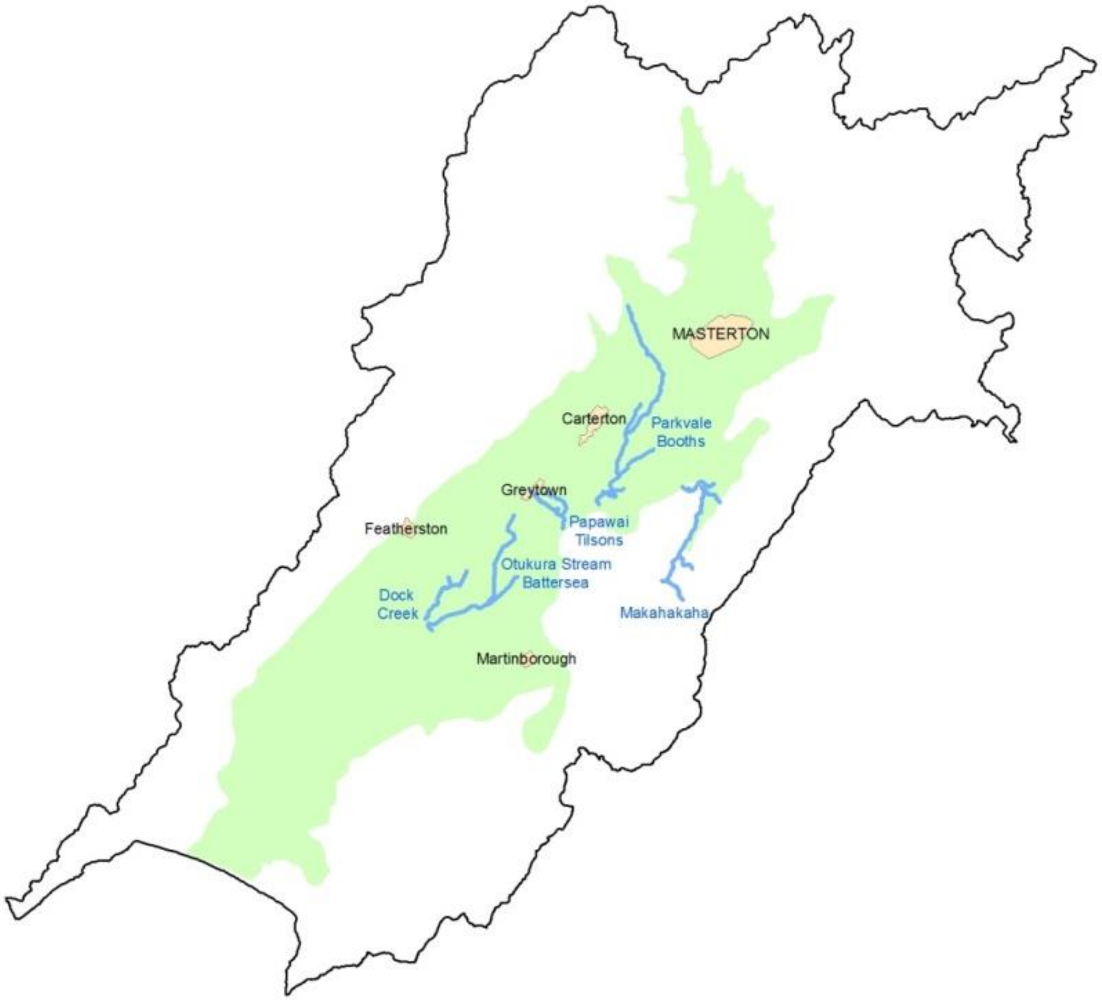
Valley floor streams FMU



Characterised by:

- Low summer flows and relatively limited flushing
- Surrounded by intensive land use
- Often poor quality
- High levels of abstraction relative to rivers

greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Allocation limits - what to do?

Three choices for WIP:

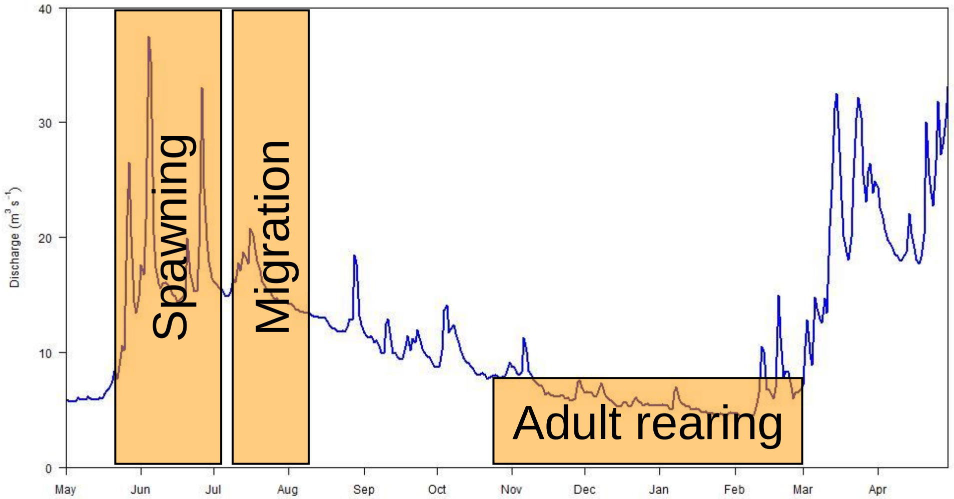
1. Continue the current default limits (proposed in the NRP)
2. As above but also include recommendations for further work to deliver more robust limits within set time frame
3. Recommend new limits (+ rationale).

Flow is a defining feature of streams

- Flow a “master variable” in streams.
- Influences many aspects of stream ecology, including:
  - Channel form
  - Transport of sediment, nutrients and food down a river system
  - and the distribution and behaviour of organisms.

Understanding the flow regime

- Must consider the whole flow regime
  - How much? (Magnitude)
  - How often? (Frequency)
  - How long? (Duration)
  - When? (Timing)
  - How quick? (Rate of change)
- Different aspects of the flow regime have different ecological & geomorphological functions



What happens when you reduce flows?

Reduced connectivity

Sediment deposition increased

Excessive macrophyte growth

Less habitat

Migration cues lost

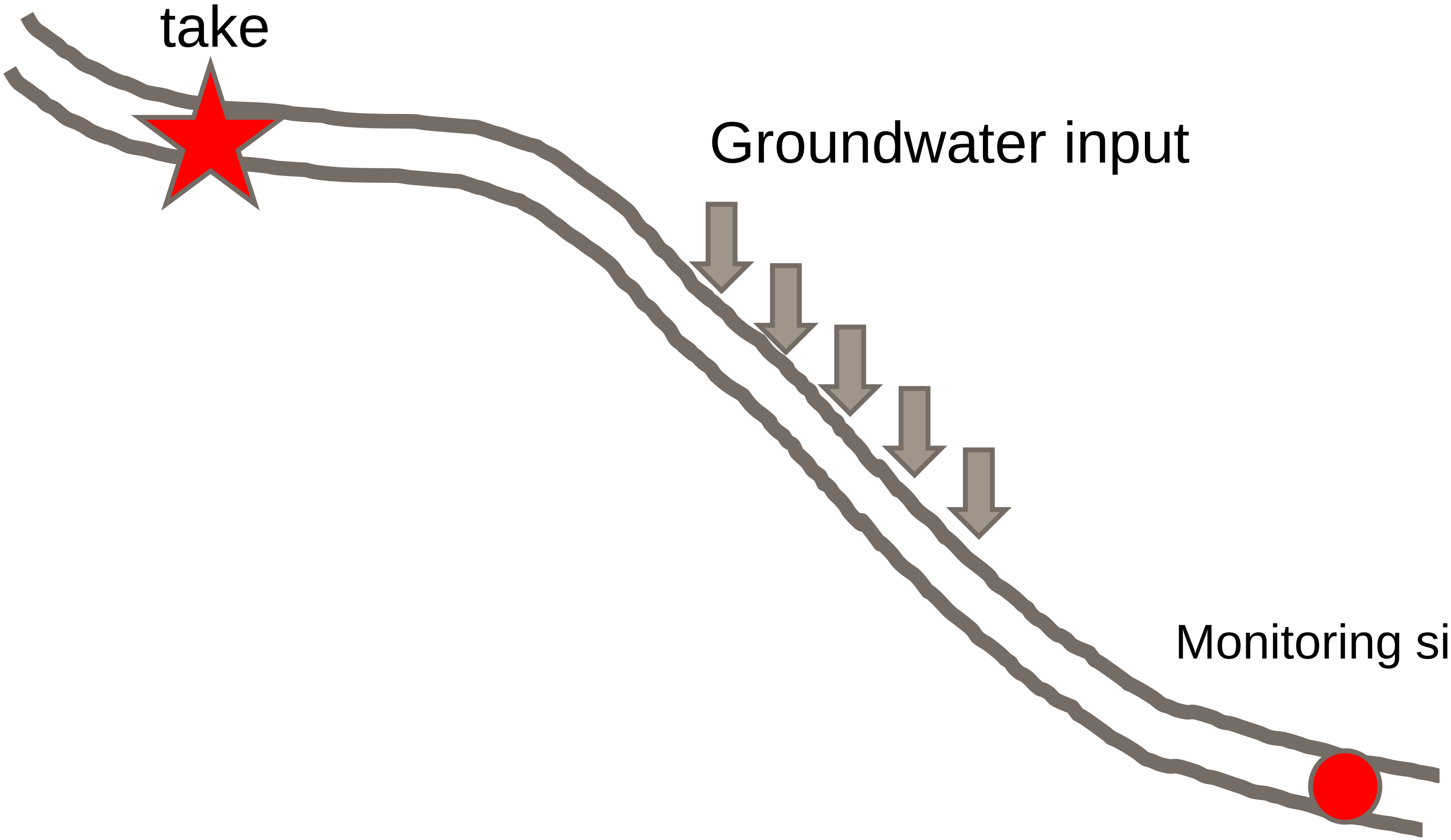
Proliferation of algae

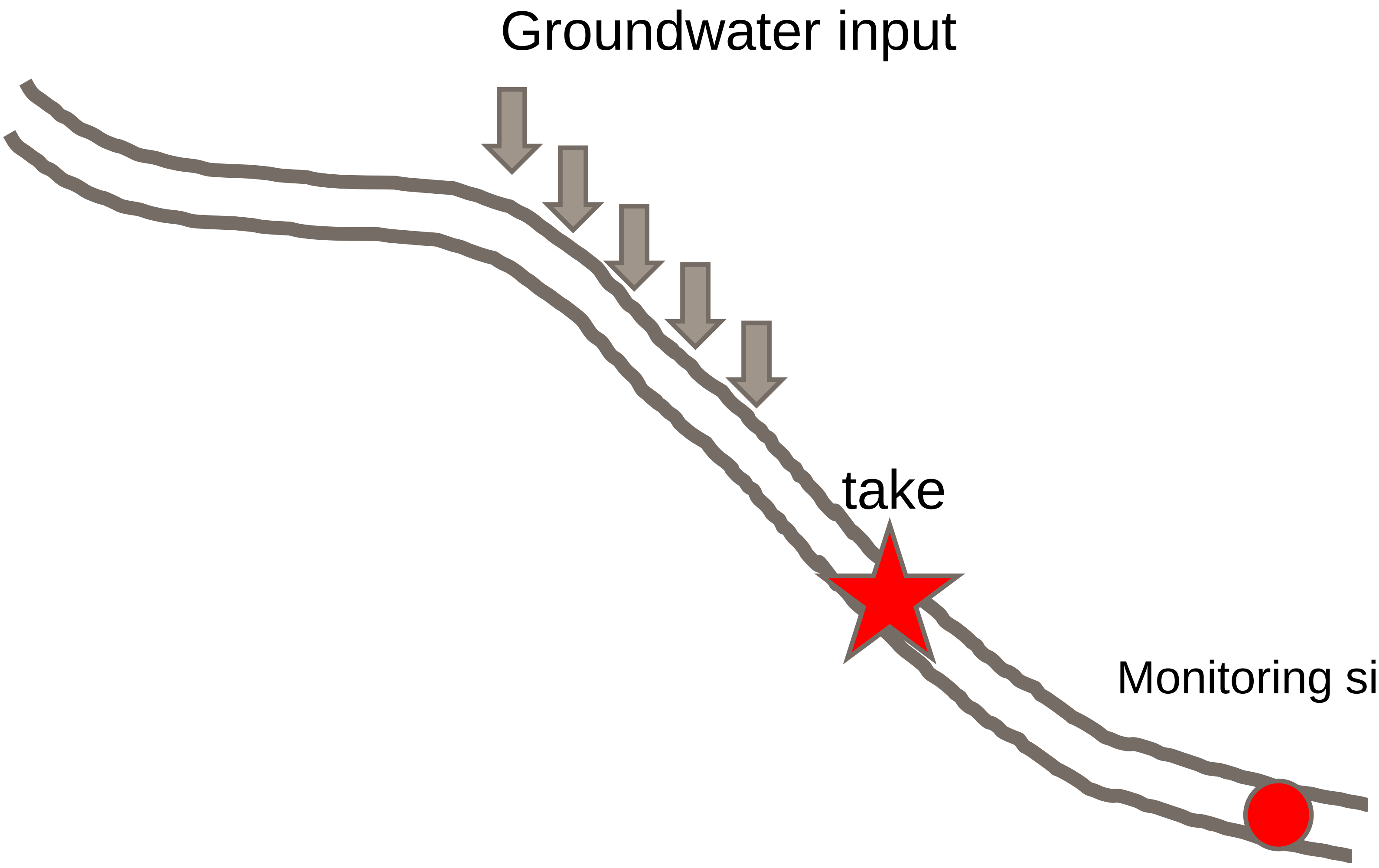
Spawning habitat inaccessible

Increased water temperatures

Reduced reaeration

Lower dilution of contaminants


take
Groundwater input
Monitoring site


Groundwater input
take
Monitoring site

Key Components of flow management (required by NPS-FM)

- Minimum flow is the flow at which abstraction must be restricted or cease
  - Provides refuge for instream values during periods of low flow
- Allocation limit is the rate (or volume) that water can be extracted
  - Protects instream values by controlling length of low flow period and maintaining some flow variability
  - Maintains reliability of supply to abstractors

Technical assessment methods

- Historical flow methods

Assume status quo is best
Assume linear response to flow
Non-specific
Easily applied

- Generalised habitat modelling

- Hydraulic habitat modelling

- Water quality modelling

- Ecohydraulics modelling

Assumes habitat (or WQ) is limiting
Non-linear flow response
Linked with specific values
Data hungry
Expensive
Controversial

Protection levels

- Risk management
- High value then accept minimal risk
  - minimum flow provides 90-100% habitat retention at naturalised MALF
  - allocation limit 10-20% of MALF
- Lower value then accept more risk
  - minimum flow provides 70-80% habitat retention at naturalised MALF
  - allocation limit 20-30% of MALF

Common approaches in other regions

- Historical flow methods to guide broad-scale flow management decisions
- Detailed instream habitat analysis for rivers with very high values and/or large flow alteration
- Protection levels based on risk assessment
- Allocation limits set based on security of supply

Thinking about over-allocation

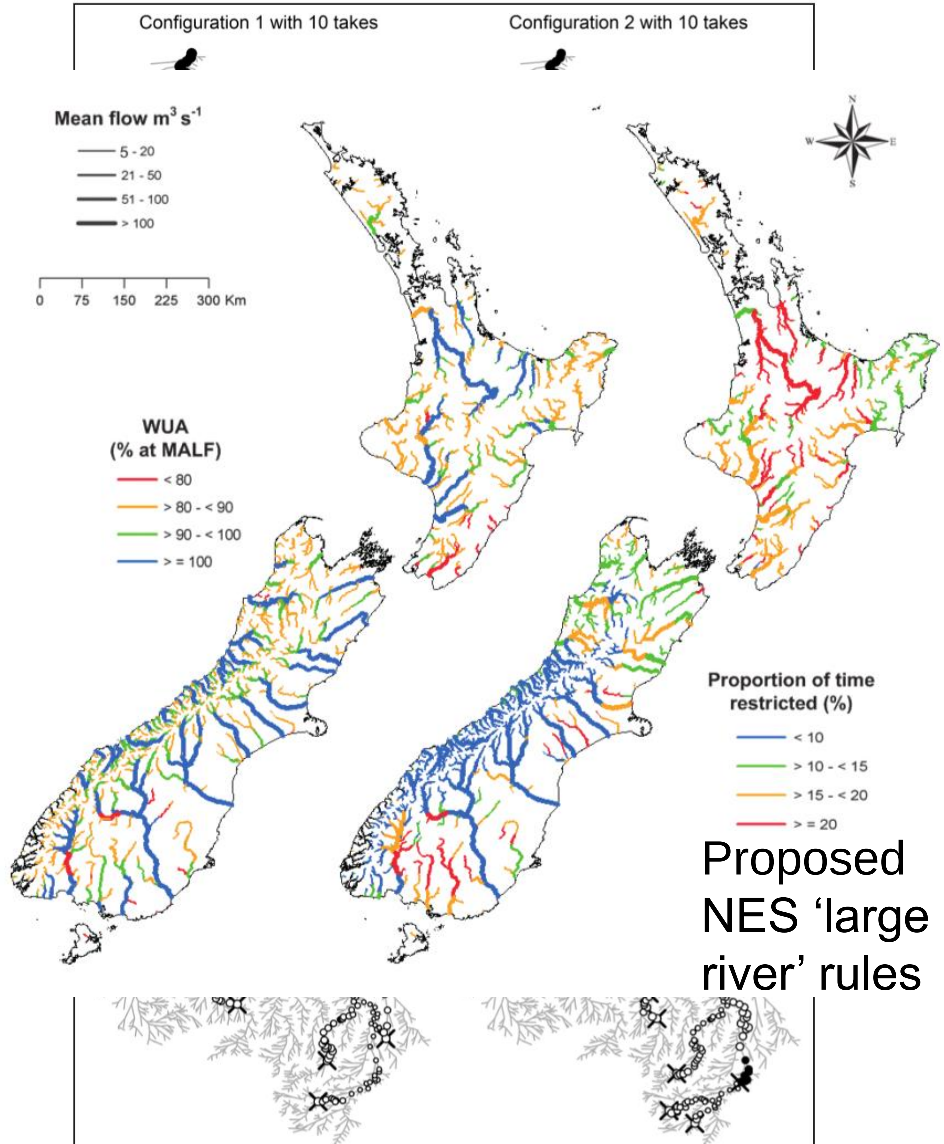
- NPSFM defines over-allocation as:
  - When the water resource has been allocated beyond a limit;
  - a

Why is this important?

- BUT little guidance on the spatial and temporal resolution at which limits or objectives should apply

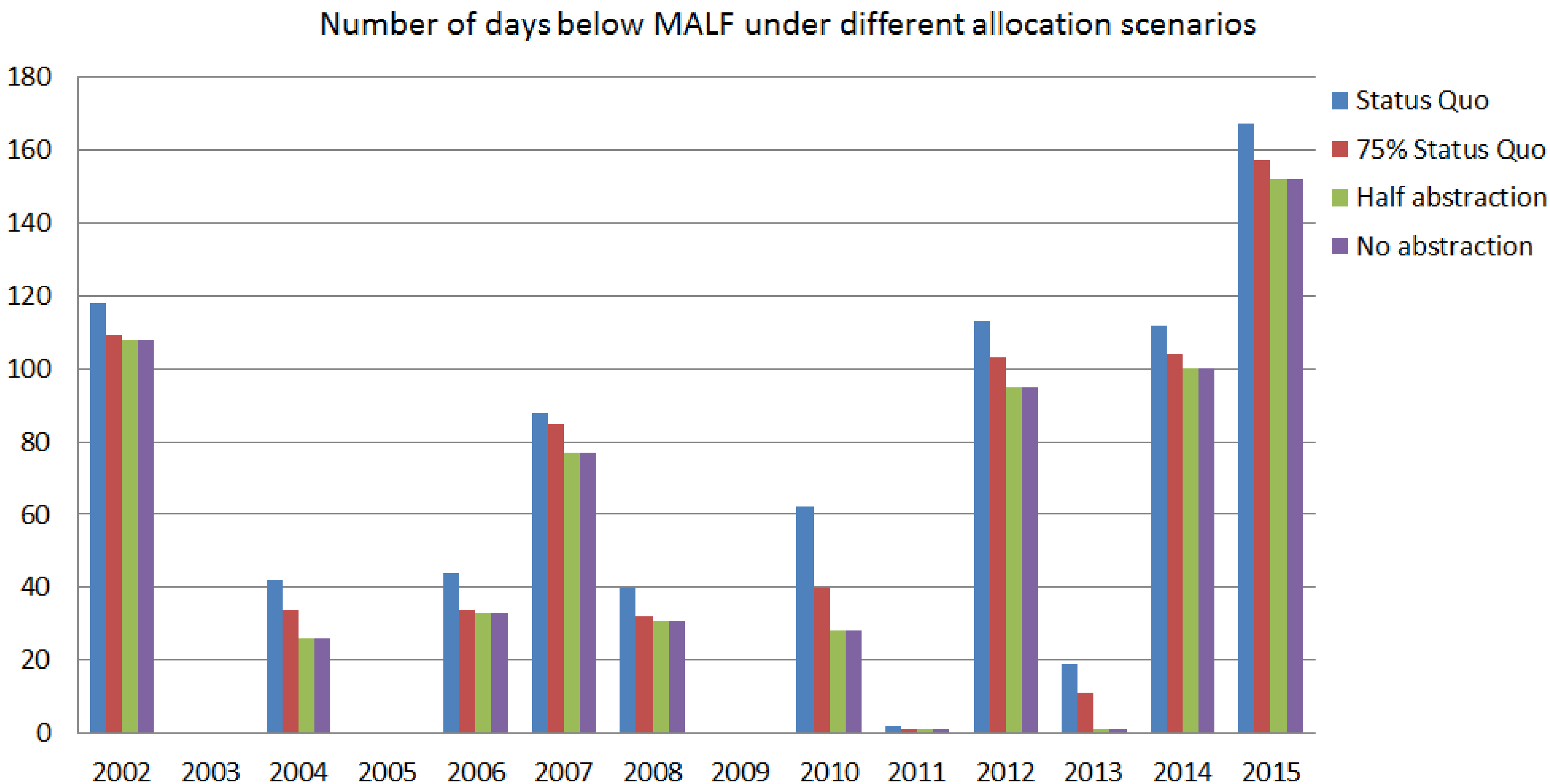
Thinking about over-allocation

- Freshwater values vary in space & time
- Water resource availability varies in space time
- Water resource use varies in space & time
- Need to consider how to balance spatial (
temporal) variations in values, objectives
implementation of limits
- Uniform rules don't result in uniform outcomes
- Same limit implemented in different ways can have different consequences



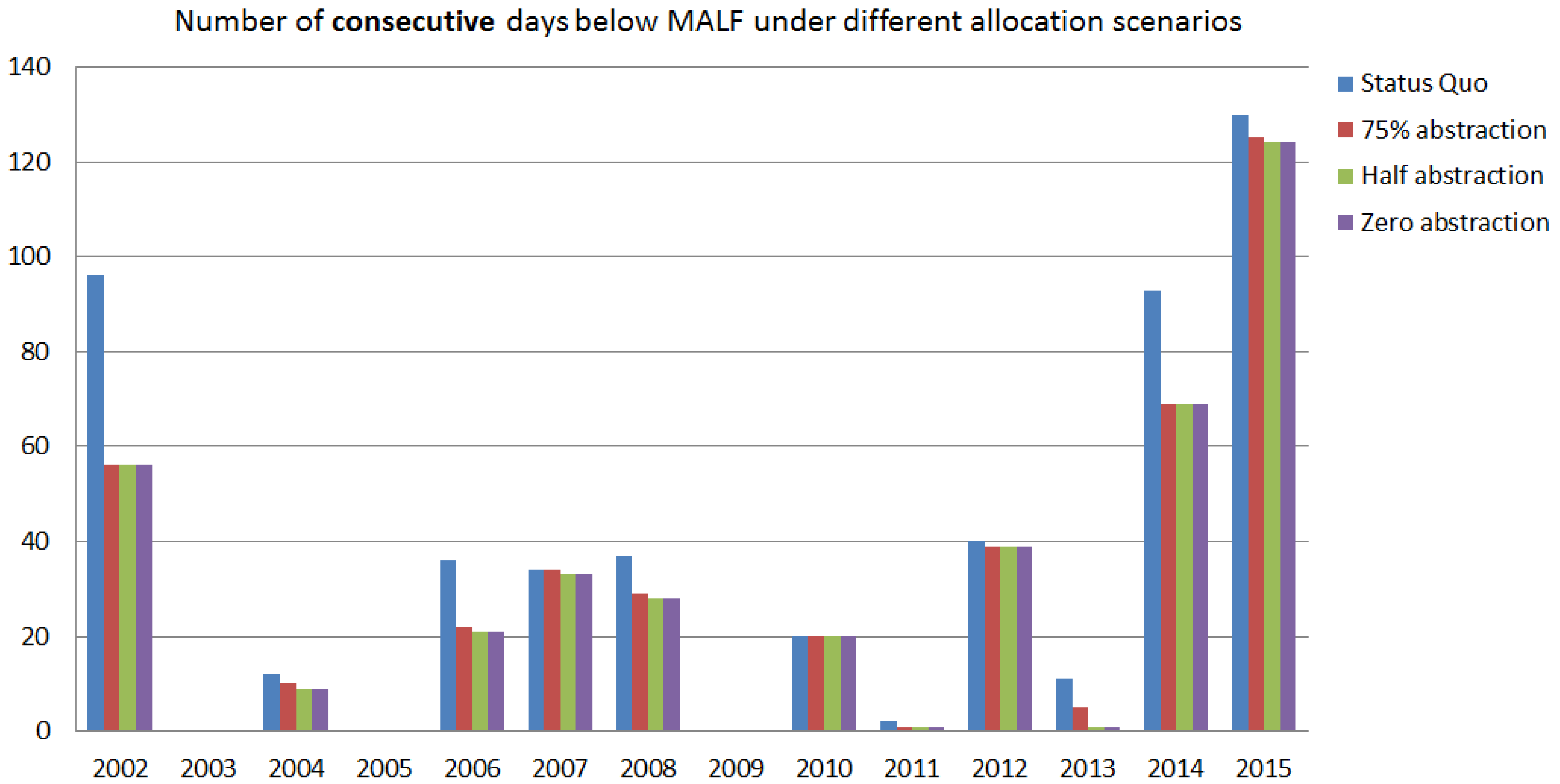
Proposed NES 'large river' rules

Parkvale Stream
Duration of low flows



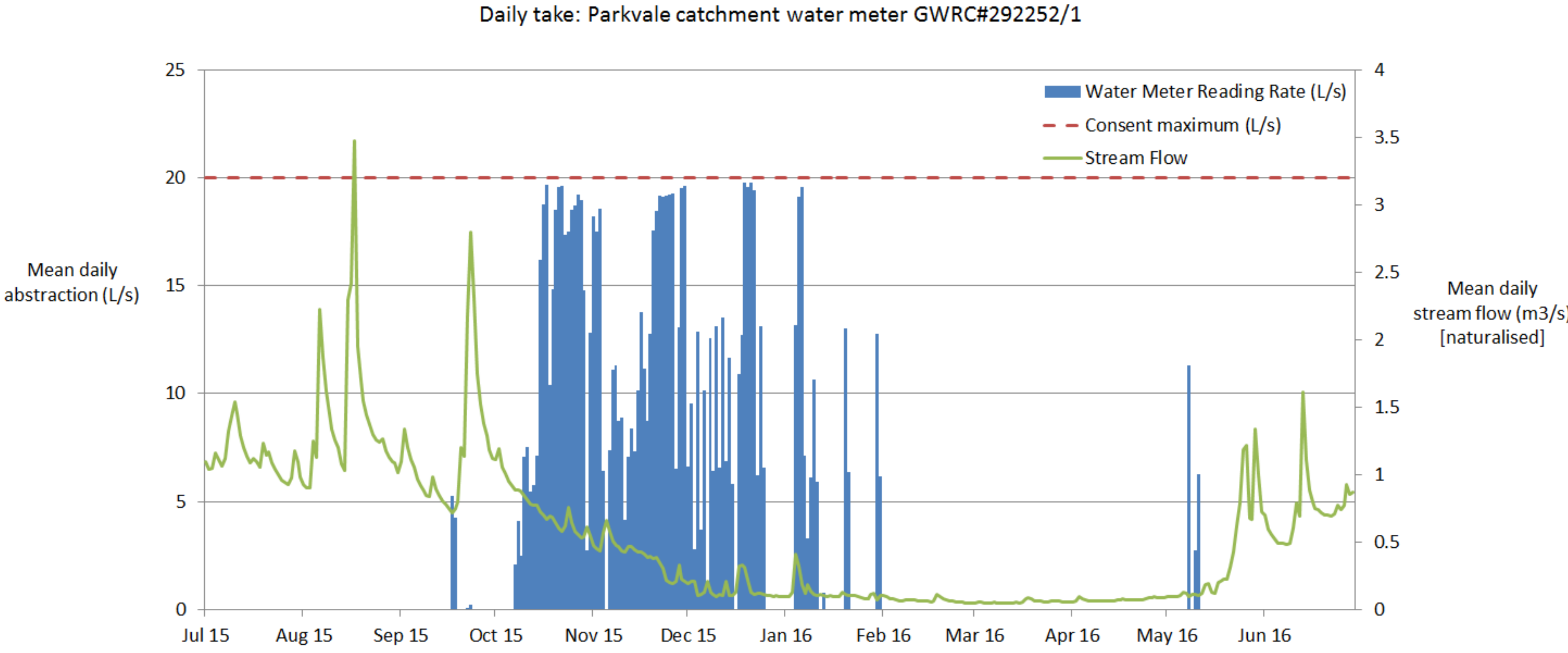
greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Parkvale Stream
Duration of low flows



greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Existing practice



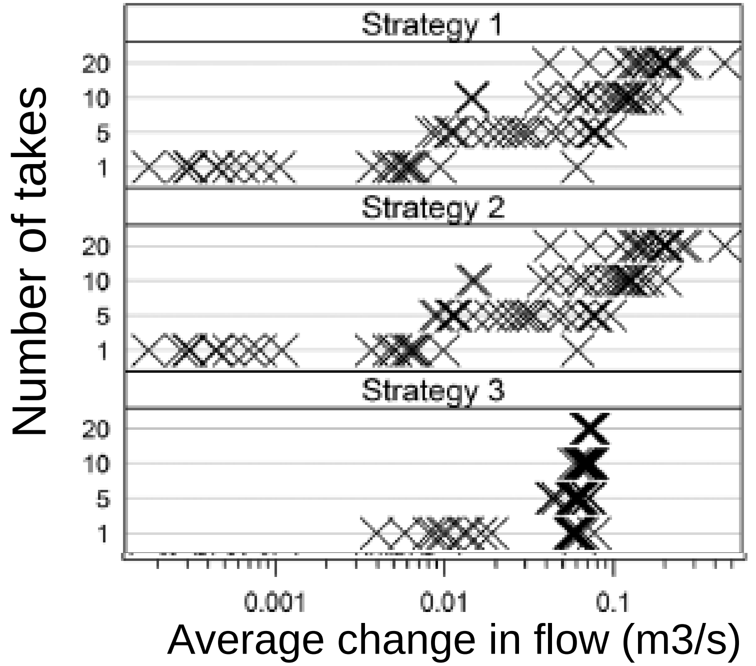
greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Different application of rules leads to different outcomes

	Description	Shut-off occurs when	Allocation rate at each take	Treatment of cumulative effects
Strategy 1	Each take is considered in isolation to all others and is controlled by flow at that take.	$Q_{ti} < Q_{min\,i}$	$\Delta Q_{max\,i} = 0.5\ MALF_i$	None for allocation rate, but catchment allocation increases and reliability reduces downstream of each new take.
Strategy 2	Minimum flows are controlled at catchment outlet. Allocation rate for each take is related to hydrology at the take.	$Q_{tC} < Q_{minC}$	$\Delta Q_{max\,i} = 0.5\ MALF_i$	None for allocation rate, but catchment allocation increases and reliability reduces downstream of each new take.
Strategy 3	Minimum flows are controlled at catchment outlet. Total catchment allocation is split equally between each take regardless of hydrology.	$Qt_C < Q_{minC}$	$\Delta Q_{max\,i} = \Delta Q_{maxC} / n$	Total catchment allocation is limited, but allocation rate for all existing takes is altered with the addition of each new take.

greater WELLINGTON REGIONAL COUNCIL Te Pane Matua Taiao

Average change in flow (m3/s)



Number of over-allocated reaches