

Species Richness and Composition of Farm Dams in Southeast Tasmania

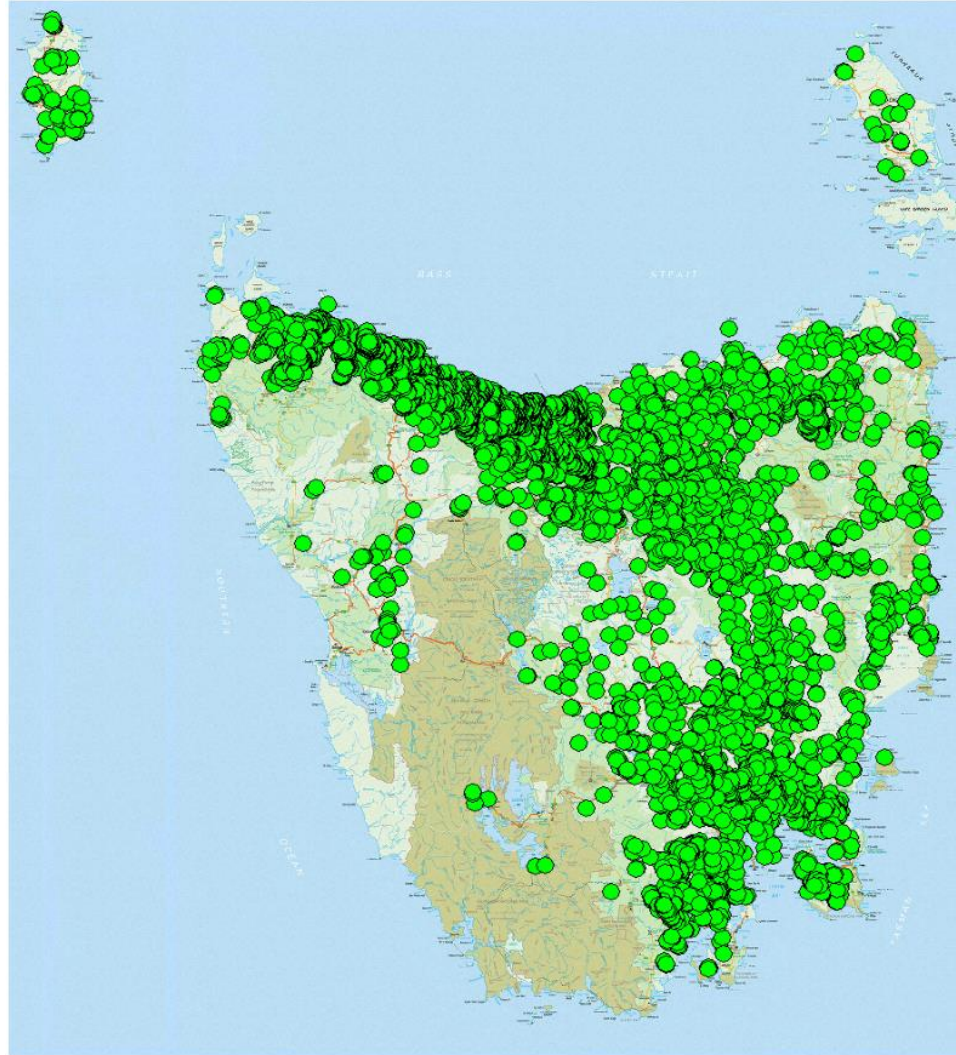
Fang Zhao, PhD Candidate, UTAS

Dams as habitat

- ▶ Biodiversity in dams/ponds
 - ▶ Macrophytes, phytoplankton, macroinvertebrate, wetland plants, turtles, frogs, birds
- ▶ Variables affect species richness and composition
 - ▶ Water depth (Stomp et al. 2011; Queiroz et al. 2015)
 - ▶ Dam size (Santi et al. 2010; Hassall et al. 2011)
 - ▶ Turbidity (Dragonmir et al. 2018)
 - ▶ pH, conductivity (Bloechl et al. 2010)
 - ▶ Emergent aquatic plant (Nakanishi et al. 2014)
 - ▶ Bank vegetation type (Lemckert et al. 2006)

Dams in Tasmania

- ▶ Water Management Act 1999
 - ▶ Water Information System of Tasmania (WIST)
 - ▶ Permit for dams
- ▶ Number of registered dam
 - ▶ 7,719 in 2007
 - ▶ 9,404 in 2015 (9,331 non-hydro dams)
- ▶ Purpose of dams
 - ▶ Irrigation, stock, domestic use



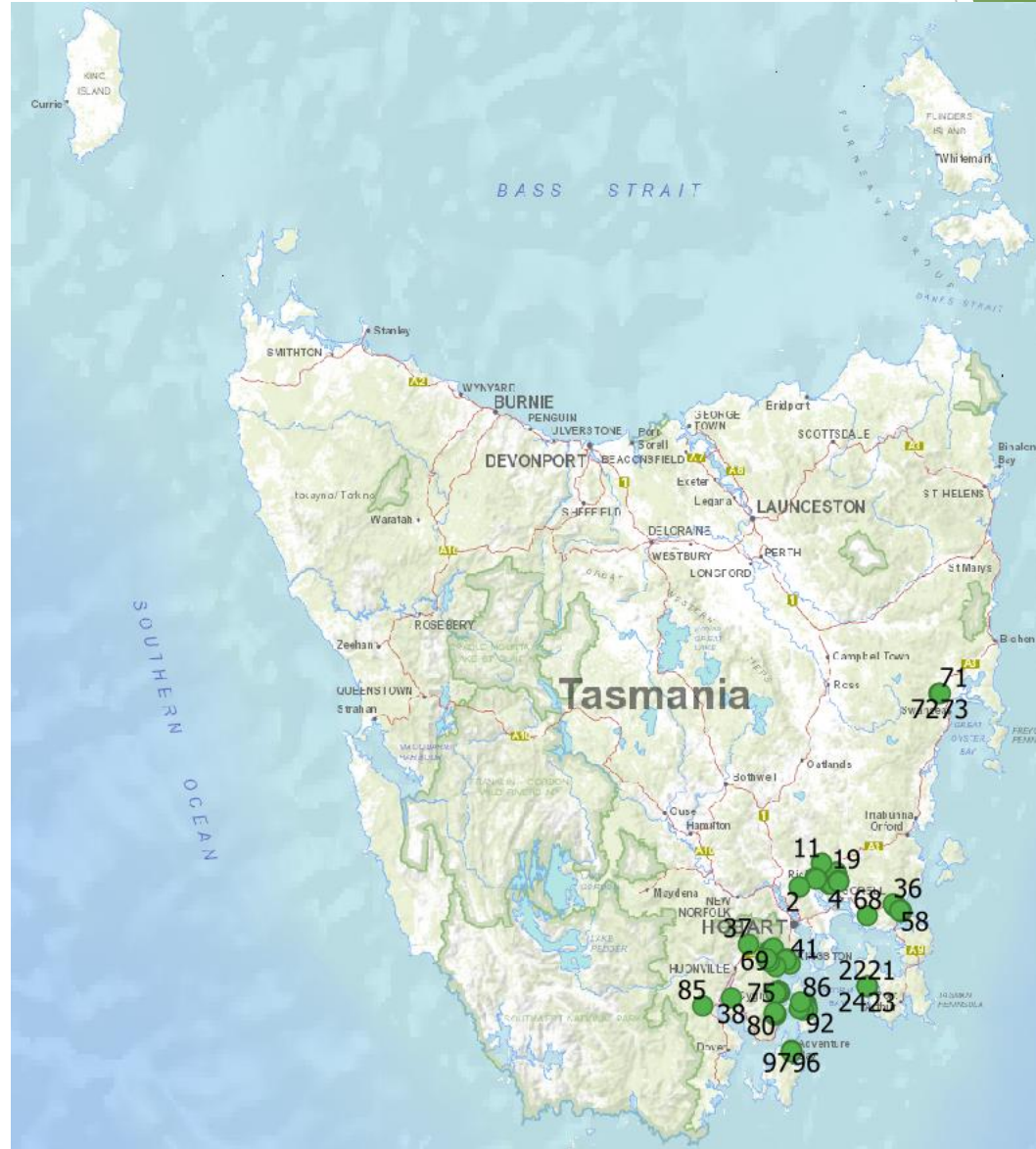
S Campbell 2015, pers comm.

Aim

- ▶ Aim: Determine the relationship of species richness and composition with environmental variables
 - ▶ Plant, macroinvertebrate and frog species richness and composition
 - ▶ Physical variables - altitude, depth, size, age, seasonality, bank height, slope, water source, dam purpose
 - ▶ Chemical variables - pH, turbidity, conductivity, dissolved oxygen, nitrogen, phosphorous and sodium
 - ▶ Biological variables - richness and composition of each taxonomic group

Dam survey

- ▶ 104 dams in south-eastern Tasmania
 - ▶ Private and public land
 - ▶ Oct to Dec, 2016 and 2017
- ▶ Field
 - ▶ Physical and chemical variables
 - ▶ Species and water sample collection
- ▶ Lab data
 - ▶ Species identification
 - ▶ Chemical variables - Water quality



Results - Environmental variables

- ▶ Most dams:
 - ▶ Not dry in last 5 years (80%)
 - ▶ Surface area < 1000 m² (70%)
 - ▶ > 10 years old (90%)
 - ▶ Multiple water sources
- ▶ Water quality vary
 - ▶ pH: 6.5-8.9
 - ▶ Nitrogen: 0.01 - 15.2 (mg/l)
 - ▶ Phosphorous: 0.1 - 31.0 (mg/l)

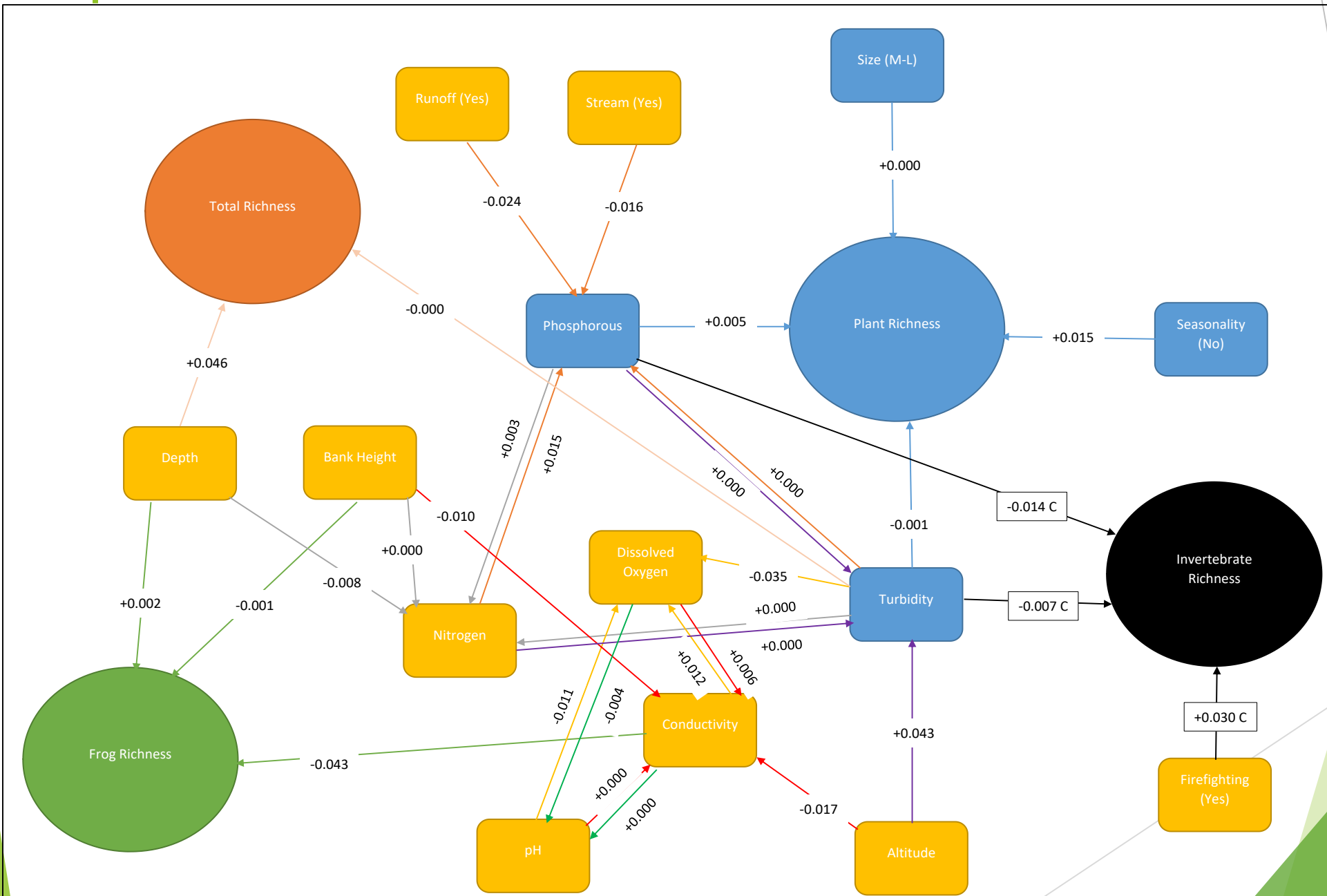


Results - Species richness

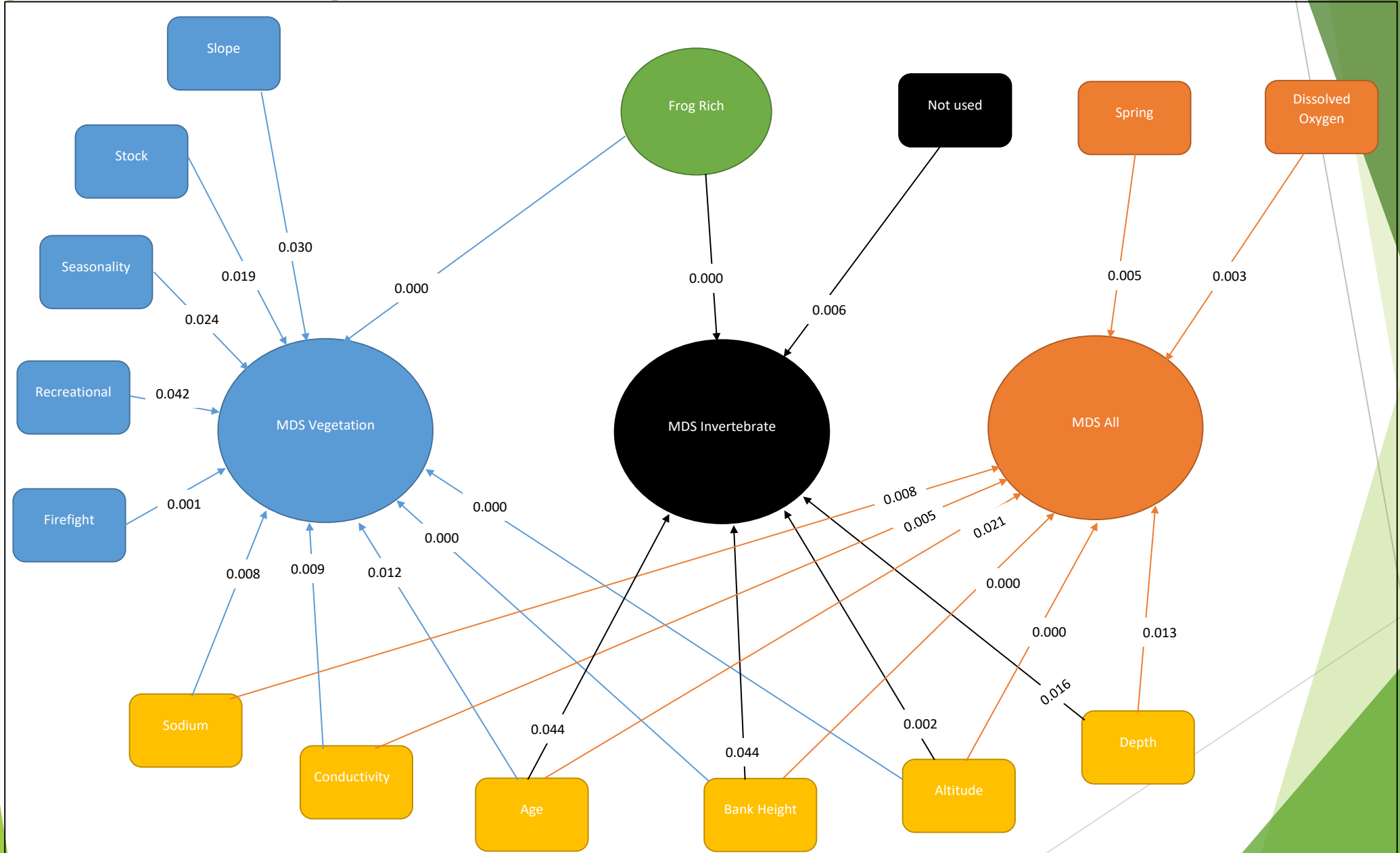
- ▶ Total 261 species, including
 - ▶ 114 macroinvertebrate taxa
 - ▶ 6 frog taxa
 - ▶ From 63 dams
 - ▶ No rare/threatened species
 - ▶ 141 vascular plant taxa
 - ▶ Four endemic species
 - ▶ Three rare species



Species richness VS Environmental variables



Species composition VS Environmental variables



Planning dams for conservation outcomes

- ▶ Design dams for specific conservation outcomes
 - ▶ High plant species richness - Clean deep permanent water with high phosphorous
 - ▶ High macroinvertebrate species richness - controlled disturbance, high water level and limited aquatic plants
 - ▶ High frog species richness - deep water dam on flat area or gentle slope
 - ▶ High richness in all taxonomic groups - large permanent dams for domestic use, deep clean water and limited disturbance

Summary

- ▶ Dams provide habitat for plant, macroinvertebrate and frog species in TAS
- ▶ Total 261 species observed in 104 surveyed dams
- ▶ Significant relationships between species richness and composition and environmental variables
- ▶ Possible to design dams to maximise species diversity values

References

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