# Koura Conceptual Model

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The figure below describes the current understanding of factors influencing the distribution and abundance of koura in the Te Arawa lakes. This model is a modification of the original model developed in FRST programme "Restoration of Aquatic Ecosystems Programme, Nov 2004"(CO1X0305). The model defines three key factors (habitat quality, food supply and predation) which collectively contribute to the quality and quantity of koura in the lakes. Each of these key factors can be described by a range of variables (white boxes). The arrows describe the relationships between variables. A description of each of these variables is listed in the table below. This model can be used to identify possible management priories, as well as test hypotheses and provide research ideas.

For a more detailed description of factors influencing koura in the Te Arawa lakes refer to Parkyn S; Kusabs I (2007) Taonga and mahinga kai species of the Te Arawa lakes - koura. (https://www.niwascience.co.nz/maori/research/te_arawa_lakes/koura)
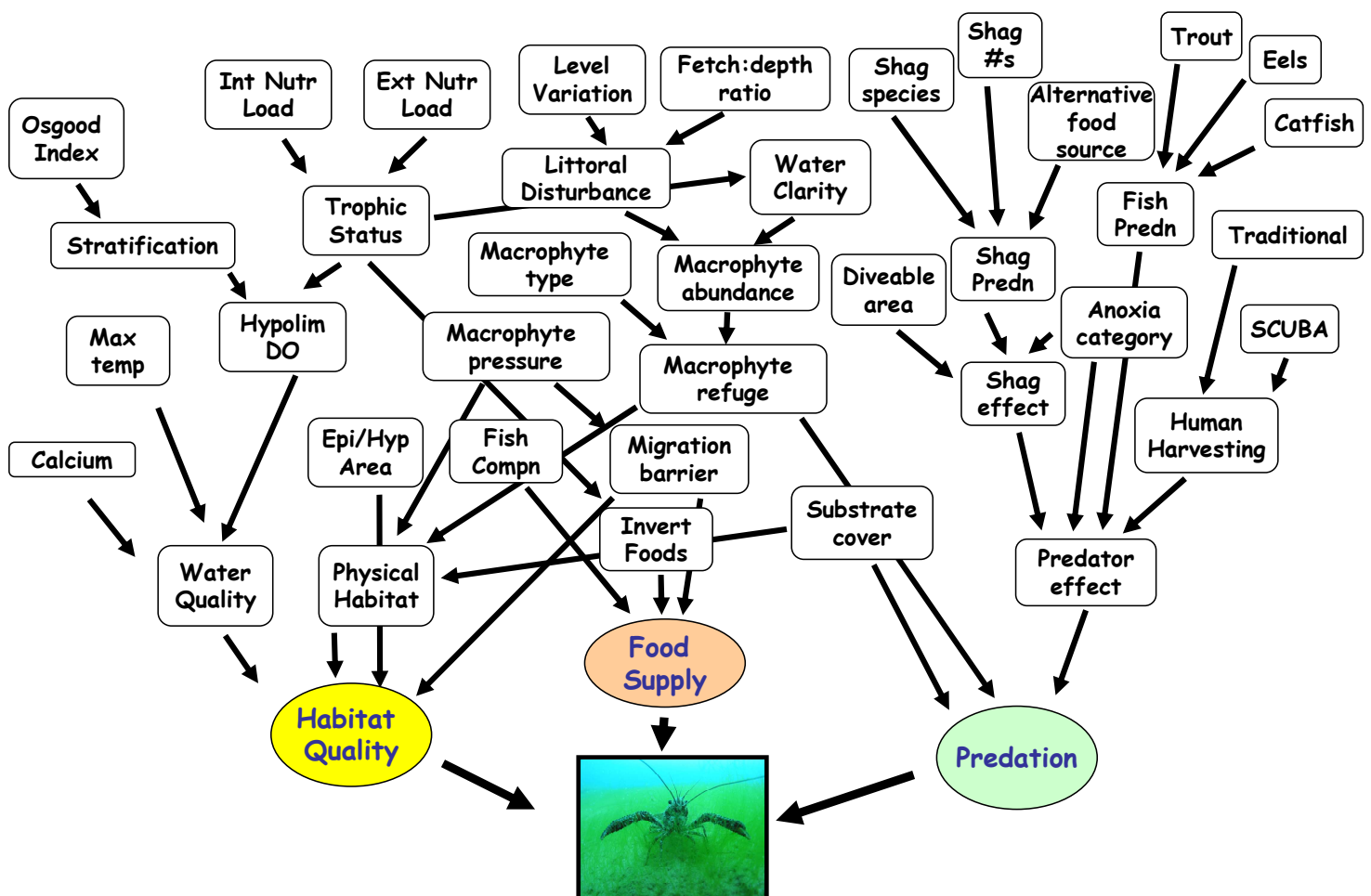
Variable name	Variable description
BottDO	Dissolved oxygen level on lake bottom
CalciumOK	Mean calcium levels recorded from lake
Catfish	Catfish present
Clarity	Water clarity measure (use bottom depth boundary of macrophyte beds as a measure of this)
Depth	Depth of littoral zone?
Eels	Eels present
EpiHypArea	Ratio of area of epilimnion (area of lake above the thermocline) to hypolimnion (area below thermocline)
ExtNutLd	Externally derived nutrient load from e.g., landuse activities
ExWeed	Exotic weed (macrophytes) characteristics
FishComp	Measure of fish competition for invertebrate food supply
FishPredn	Integrated measure of potential effects of fish predation on kōura populations
FoodSupply	Integrate measure of factors affecting food supply
HabQual	Integrated measure of PhysHab and WaterQual
Harvest	Integrated measure of potential effects of all harvesting on kōura populations
HypolimDO	Dissolved oxygen level below thermocline
IntNutLd	Internal nutrient load, derived from cycling of nutrients between bed and water column
InvertFoods	Invertebrate food supply
Kōura	Kōura presence/abundance - Variable being predicted from model
Litter	Litter disturbance
LvlVarn	Variation in lake level
Macrophytes	Integrated measure of macrophytes present
NatMac	Native macrophyte characteristics
OsgoodInd	Osgood Index – ratio of mean depth to lake area (provides indication of likelihood of stratification occurring)
PhysHab	Integrated measure of variables defining physical habitat for kōura
Predation	Integrated measure of predator effects and refuges from predators
PredatorNos	Integrated measure of potential effects of predation by shags, fish and through harvesting on kōura populations
Refuges	Integrated measure of potential for macrophytes and/or substrate as refuges for kōura
SCUBA	Non-traditional harvesting methods used to catch kōura
Shags	Presence of little, little black and black
ShagPredn	Measure of potential effect of shag predation on kōura populations
Storm	Presence of storm surge and potential effect on littoral storm
Stratification	Presence or absence of thermal stratification
Substrate	Measure of suitability of substrate as a habitat for kōura
Traditional	Traditional harvesting methods used to catch kōura
Trophic	Trophic status is a measure of the productivity of a lake, as measured by nutrient levels, algae abundance, and depth of light penetration.
Trout	Brown and/or rainbow trout present
WaterQual	Integrated measure of water quality variables preceding it