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The food consumption prediction relationship in Eq. 52 (see Predicting consumption?) contains two parameters that directly influence the time spent feeding and the predation risk that feeding may entail: a_{ij} and $v?_{ij}$. To model possible linked changes in these parameters with changes in food availability as measured by per biomass food intake rate $c_{it} = Q_{it} / B^{it}$ (*i*=juvenile index *J* or adult index *A*), we need to specify how changes in c_{it} will influence at least relative time spent foraging.

Denoting the relative time spent foraging as T_{it}, measured such that the rate of effective search during any model time step can be predicted as $a_{jit} = T_{it}\, a_{ji}$ for each prey type *j* that *i* eats. Further, we assume that time spent vulnerable to predation, as measured by $v?_{ij}$ for all predators j on i, is inversely related to ***T'it*, i.e., $v?_{ij}t = v?_{ij} / T_{it}$. An alternative structure that gives similar results is to leave the a_{ij} constant, while varying the v_{ij} by setting $v_{ijt} = T_{jt} \cdot v_{ij}$**'in the numerator of Eq. 52 in EwEugPredictingConsumption and $v_{ijt} = T_{it} \cdot v_{ij}$ in the denominator.

For convenience in estimating the a_{ij} and $v?_{ij}$ parameters, we scale T_{it} so that $T_{i0} = 1$, and $v?_{ij} = v_{ij}$. Using these scaling conventions, the key issue then becomes how to functionally relate T_{it} to food intake rate c_{it} so as to represent the hypothesis that animals with lots of food available will simply spend less time foraging, rather than increase food intake rates.

In Ecosim a simple functional form for ***T'it* is implemented that will result in near constant feeding rates, but changing time at risk to predation, in situations where rate of effective search a_{ji} is the main factor limiting food consumption rather than prey behaviour as measured by v_{ji}. This is implemented in form of the relationship:**

../Resources/Images?/0800002A.png **Eq. 65**

where, a is a user-defined Feeding time adjustment rate [0, 1] on the Ecosim Group info? form; $c_{i,opt}$ is the (internally computed) feeding rate that optimizes feeding rate versus mortality risk for *i*; $c_{i,t-1}$ is the consumption/biomass ratio in the previous time step for the group. The time spent feeding is constrained by a user-defined value (Maximum relative feeding time on the *Group info* form with default of two times the feeding rate in the Ecopath base model).

The relationship between foraging time, consumption and predator biomass is illustrated in Figure 3.4.

../Resources/Images?/0600002B.png

Figure 3.4 Relationship between relative foraging time (*T*), *Q/B* and predator biomass. If *Q/B* is held constant the foraging time (and hence predation risk) is a linear function of the predator biomass (solid line). If *T* is held constant the *Q/B* will decrease asymptotically with predator biomass (stippled line).