Fishery Model

2018-11-15

Objective: Step through optimal aggregate harvest in an open access fishery.

Swap out toy model for INAPESCA's age-structured model. Sort out selectivity and dam problems.

Toy Model (Conrad):

Stock

$$X_{t+1} = X_t(1 + r - rX_t/K - qE_t)$$

Yield-Effort

$$Y_t = qX_tE_t$$

Dynamic Effort

$$E_{t+1} = E_t(1 + \eta(pqX_t - c))$$

Variable | Definition ——— | ———- t | Timestep (Year) X | Stock (Tons) r | Growth (%) K | Carrying Capacity (Tons) q | Catchability (Parameter) E | Effort (Vessel Days) eta | Adjustability Parameter p | Price (USD2018 / Ton) c | Cost (USD2018 / Boat Day)

1. Deterministic Logistic Growth Demo

$$N_t = N_t + rN_t(1 - N_t/K)$$

```
# Growth references growth instead of stock. Merp.
grow_log = function(r, K, n0, start, end){
                     v_n = as.numeric(vector(length=(end - start)))
                     v_n[1] = n0
                     t = length(seq(start, end))
            for (i in 2:t){v_n[i] = v_n[i - 1] + r * v_n[i - 1] * (1 - v_n[i - 1] / K)}
                     return(v_n)}

v_grow_log = grow_log(0.25, 50, 10, 2000, 2025)
```

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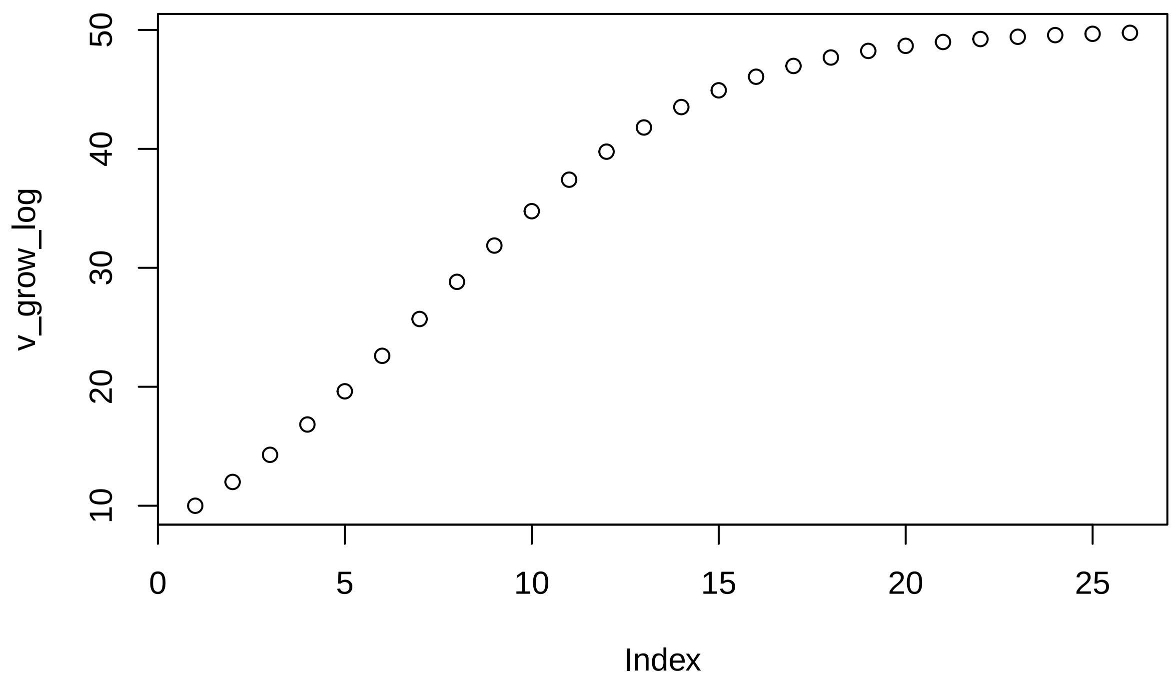
plot(v_grow_log)
```



Appendix: LaTeX Demo

$$d_i = \alpha_{0,i} - \alpha_{1,i} * x_{emissions} + u_i$$