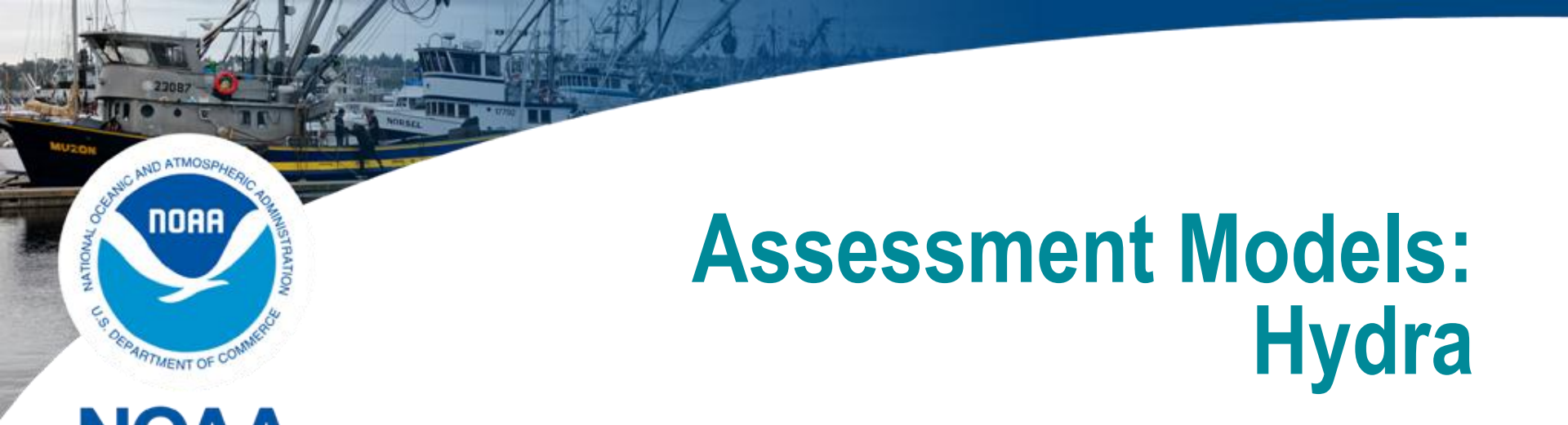


NOAA FISHERIES

NEFSC

Assessment Models: Hydra

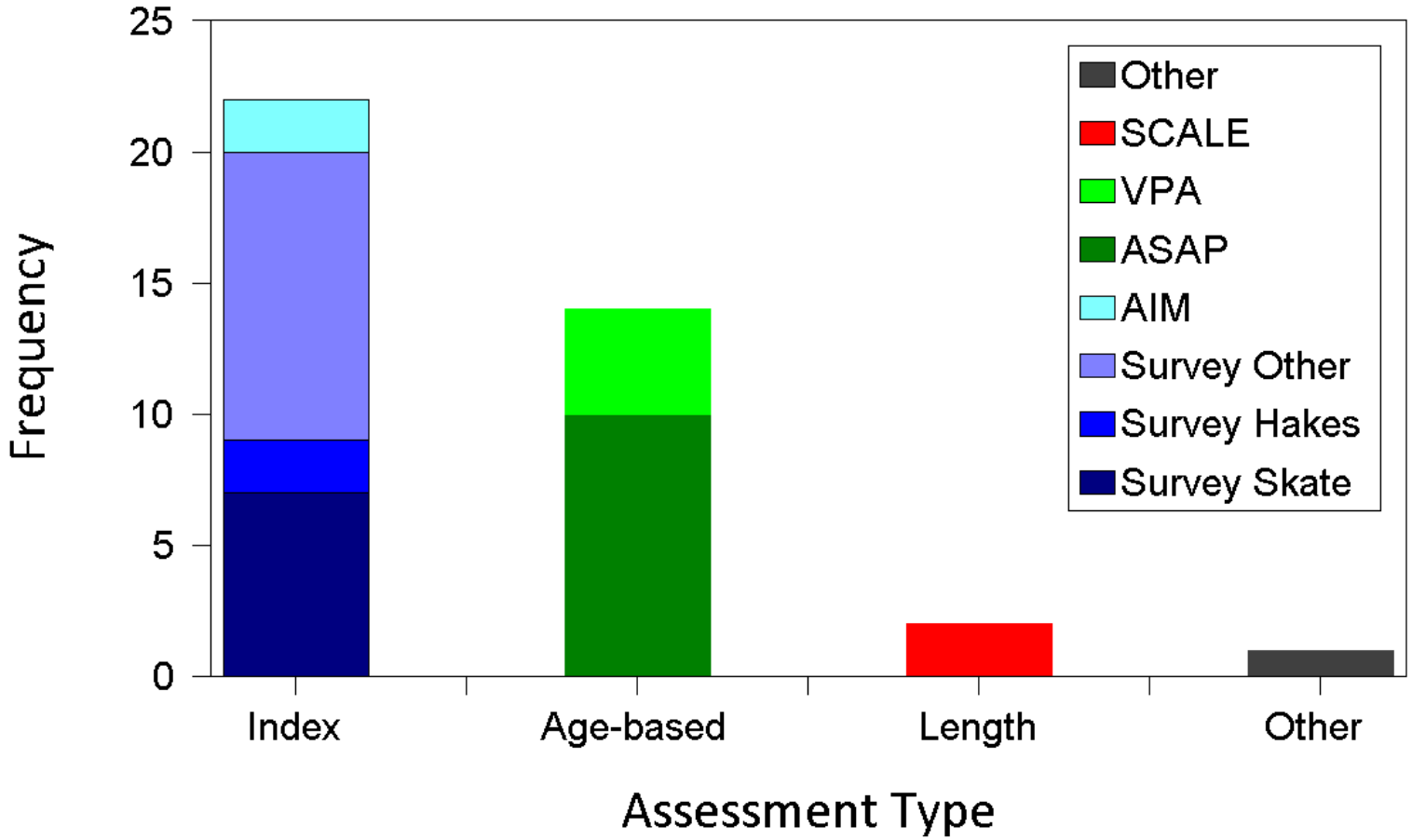
Ecosystem Based Fishery Management Strategy Review

TOR 8: Review Assessment Models and Required Data

April 30-May 2 ,2018

Woods Hole MA

Current NEFSC Single Species Assessment Approaches for NEFMC Managed Fish Species



Simulated Assessment Models

1) Model-Free Simulated Survey Index

2) Multispecies Production Model

$$B_{i,t+1} = (r_i - \alpha_{ii} B_{i,t}^{\gamma-1} + \sum_{j \neq i} \alpha_{ij} B_{j,t_i}) B_{i,t} - C_{i,t}$$

3) Multispecies Delay-Difference Model

$$B_{i,t+1} = \left[(r_i - \alpha_{ii} B_{i,t+1-k_i}^{\gamma-1} + \sum_{j \neq i} \alpha_{ij} B_{j,t+1-k_i}) B_{i,t+1-k_i} \right] + \rho_i B_{i,t} - C_{i,t}$$

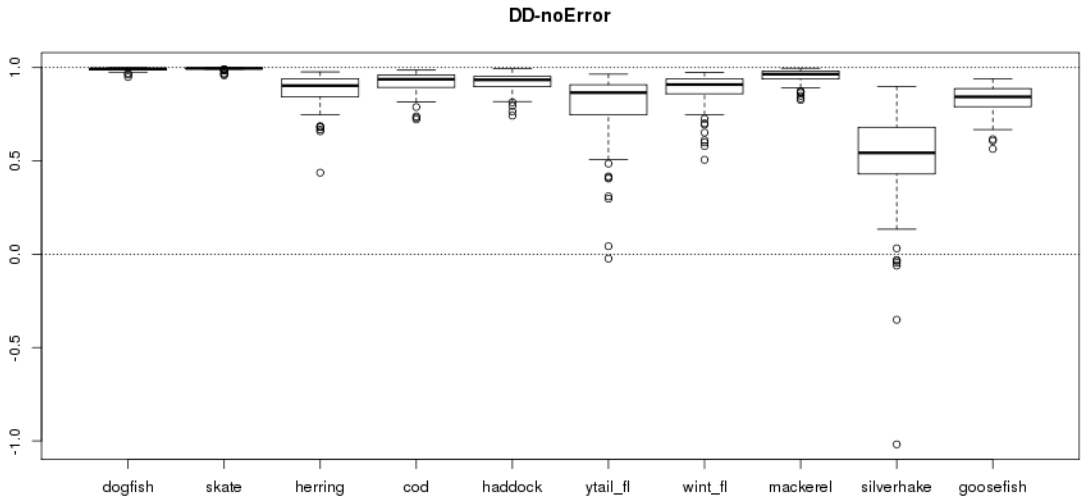
Data required: Biomass (e.g. q-corrected survey estimates)
and Catch by species and functional group)

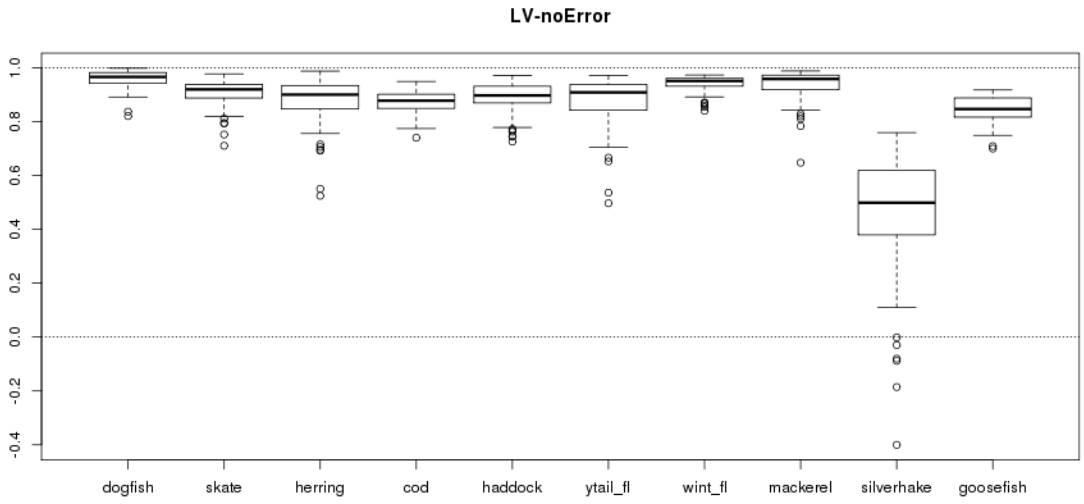
Modeling Efficiency Index

$$MEF = \frac{\left(\sum_{i=1}^{n} \left(O_i - \overline{O} \right)^2 - \sum_{i=1}^{n} \left(P_i - \overline{O} \right)^2 \right)}{\sum_{i=1}^{n} \left(O_i - \overline{O} \right)^2}$$

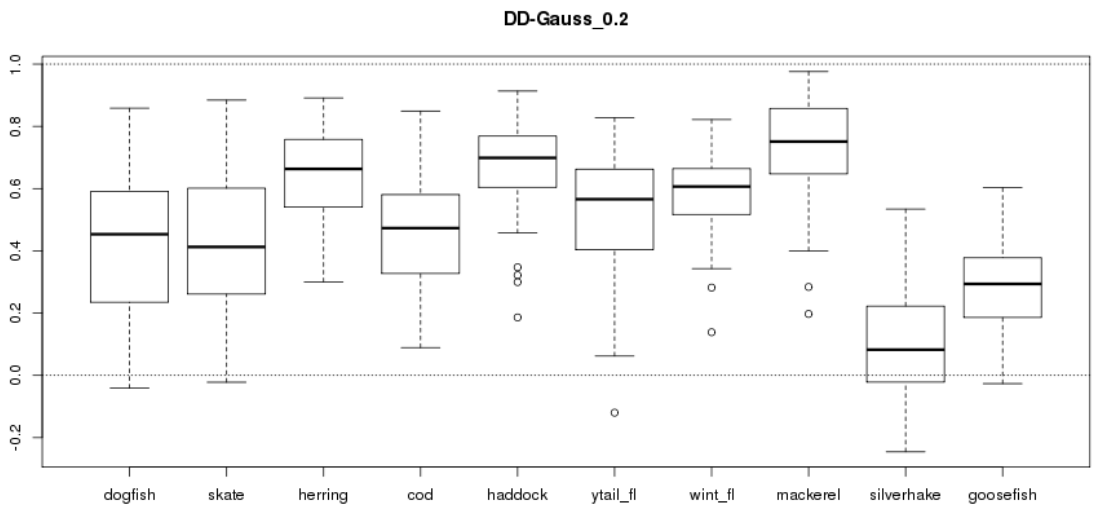
where O_i is the ith observation, *O bar* is the average over all observations, and P_i is the ith predicted value. Alternatively, the MEF can be expressed as $(1\text{-}RMSE^2)/s^2$ where RMSE is the root mean square error and s^2 is the sample variance of the observations

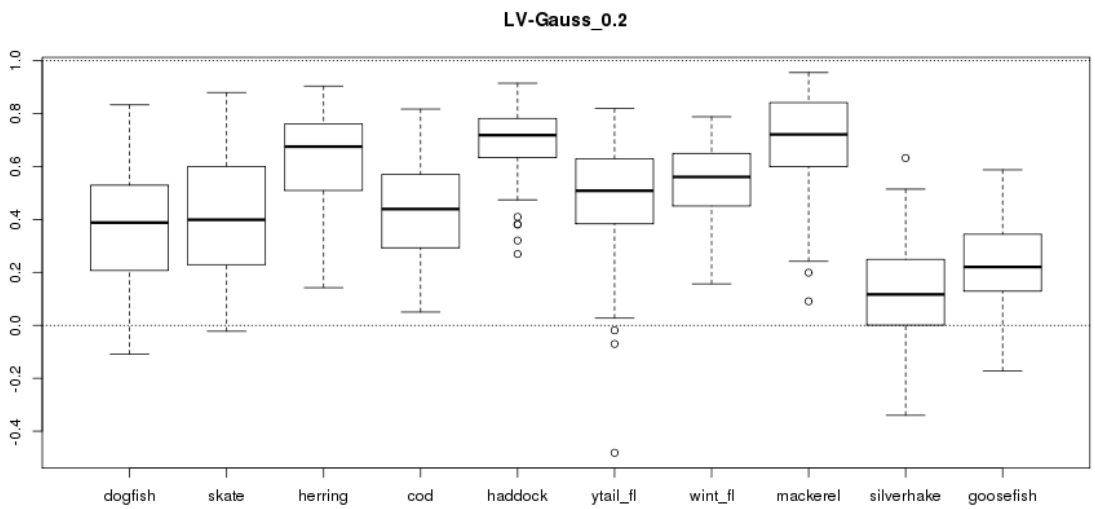
Modeling Efficiency Index: No Observation Error



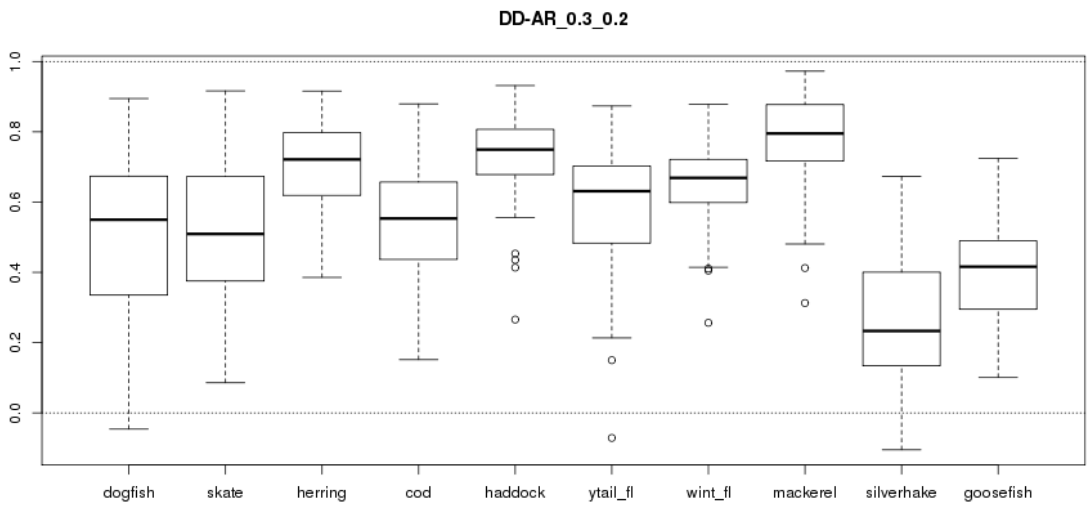


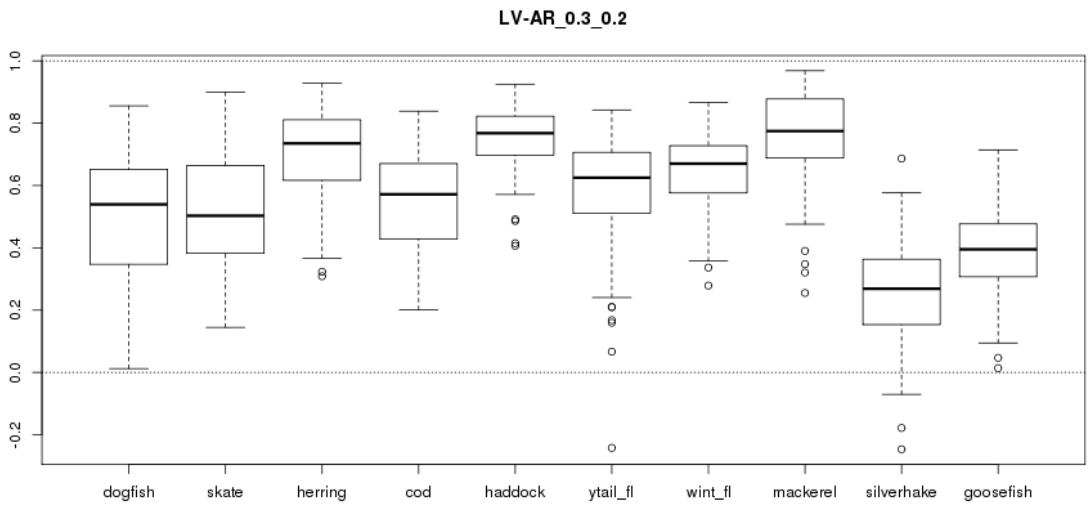
Modeling Efficiency Index
White Noise CV = 20%



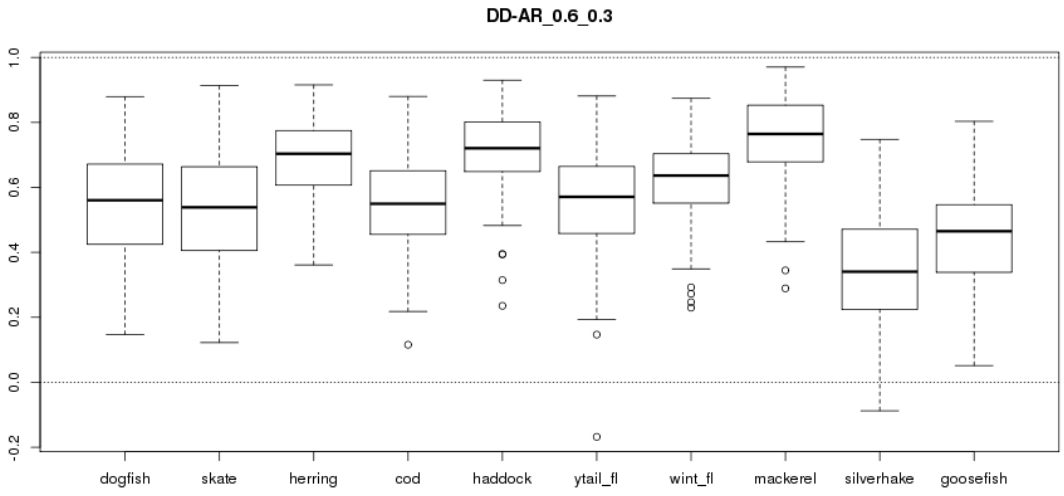


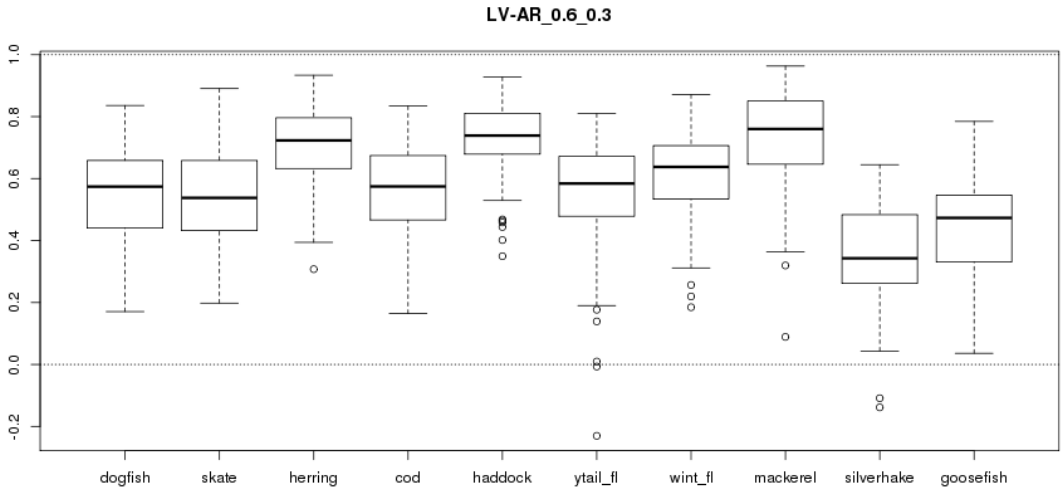
Modeling Efficiency Index
CV=20% AR=0.3



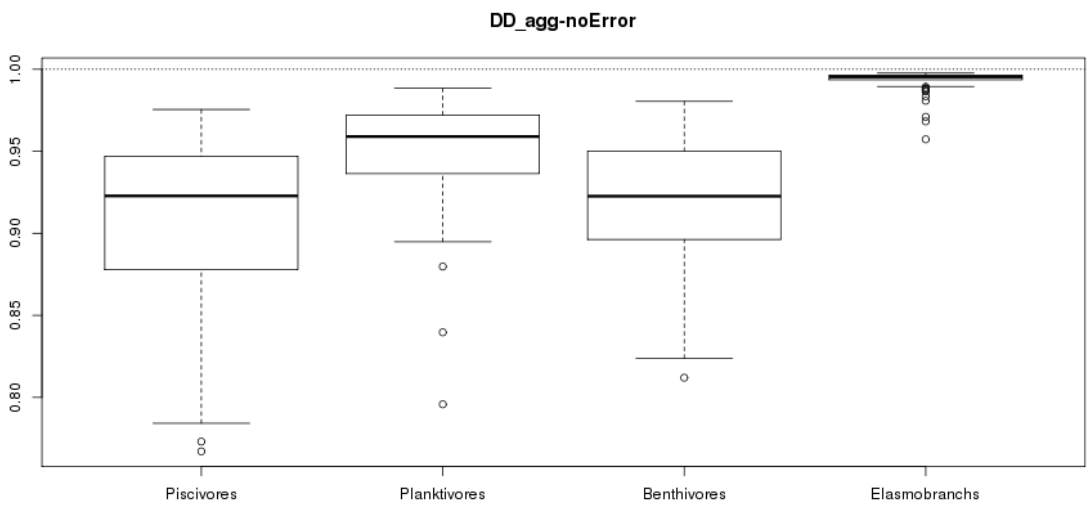


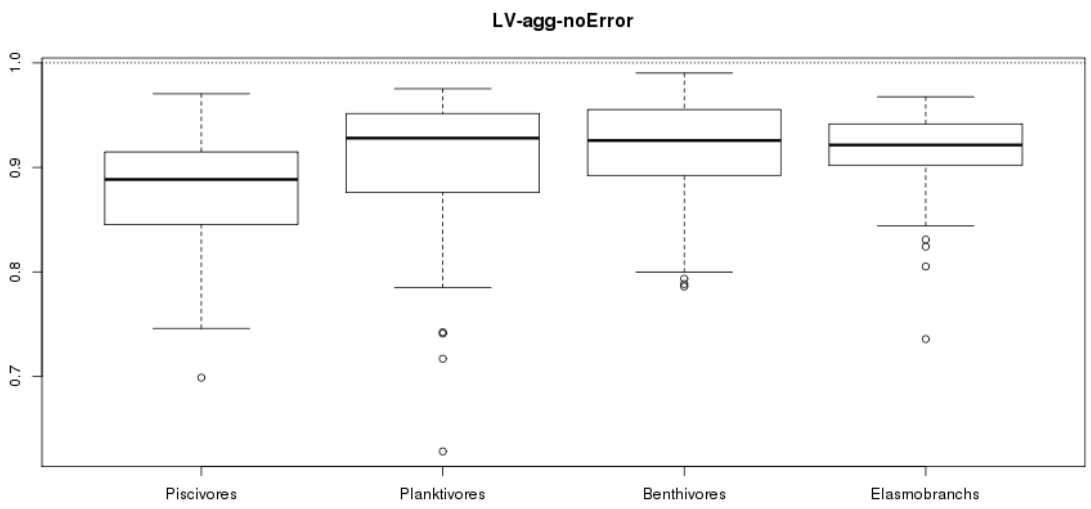
Modeling Efficiency Metric
CV=30% AR=0.6



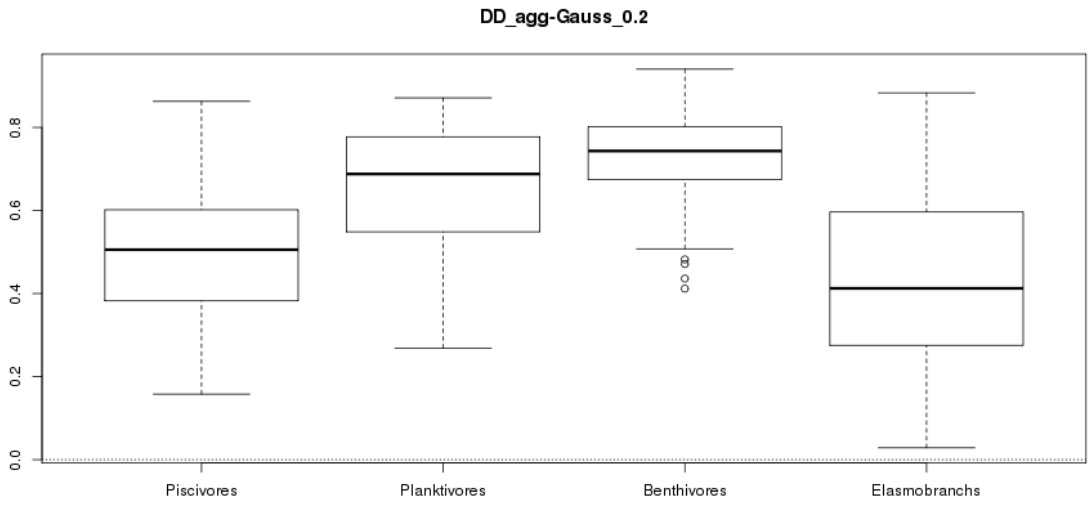


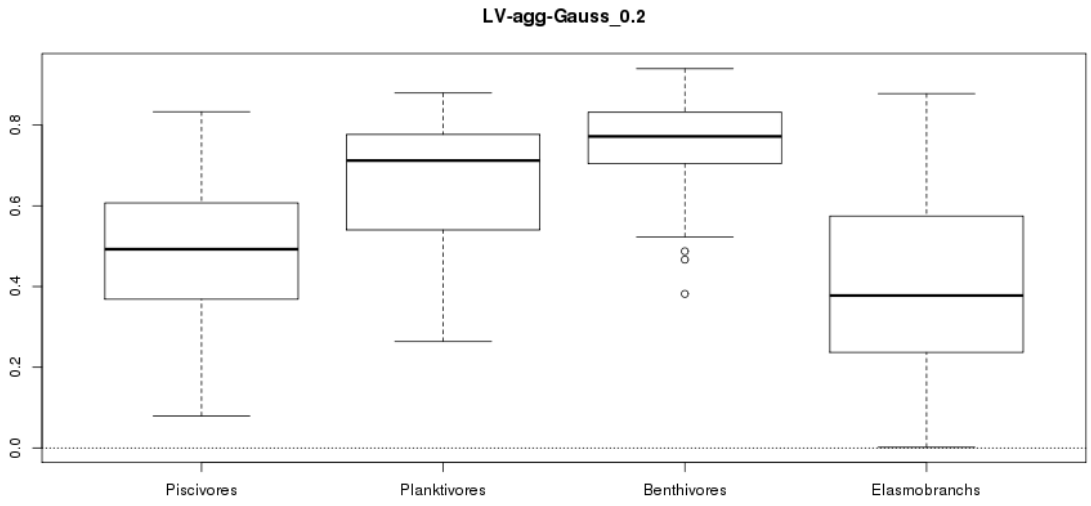
Modeling Efficiency Index
Functional Group: No Observation Error



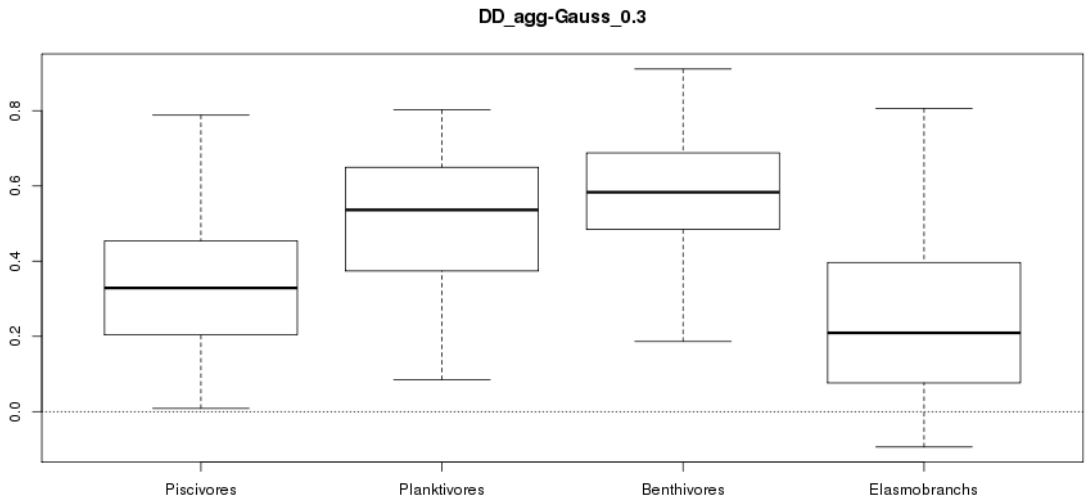


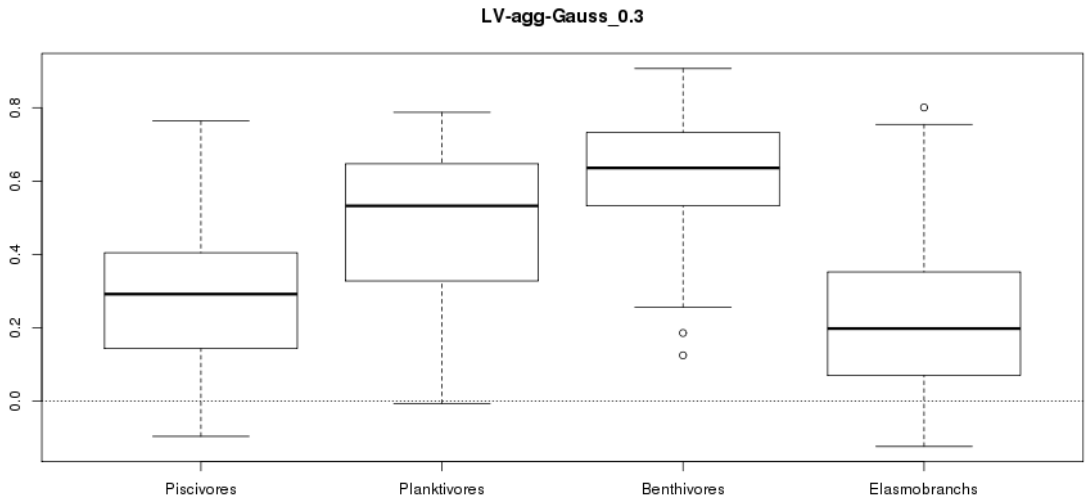
Modeling Efficiency Index
Functional Group: White Noise CV=20%



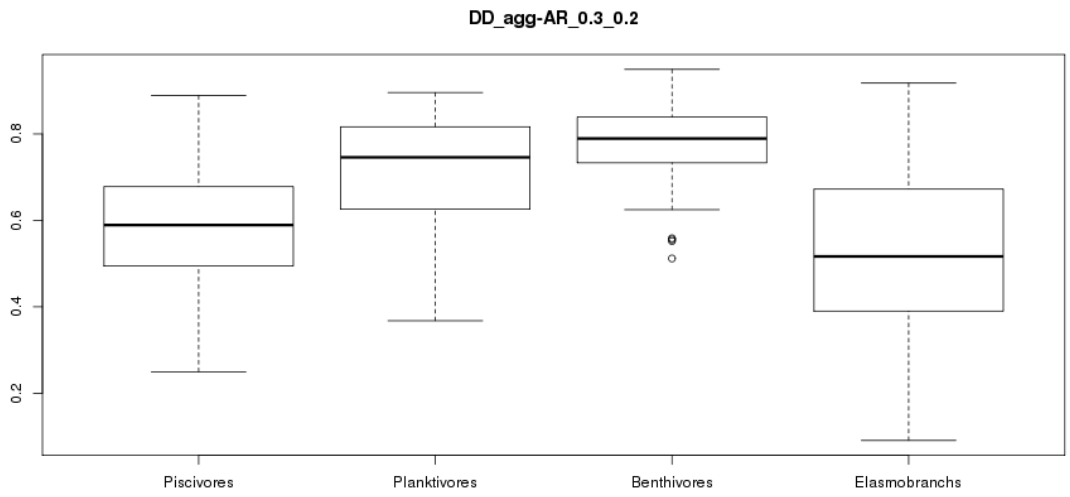


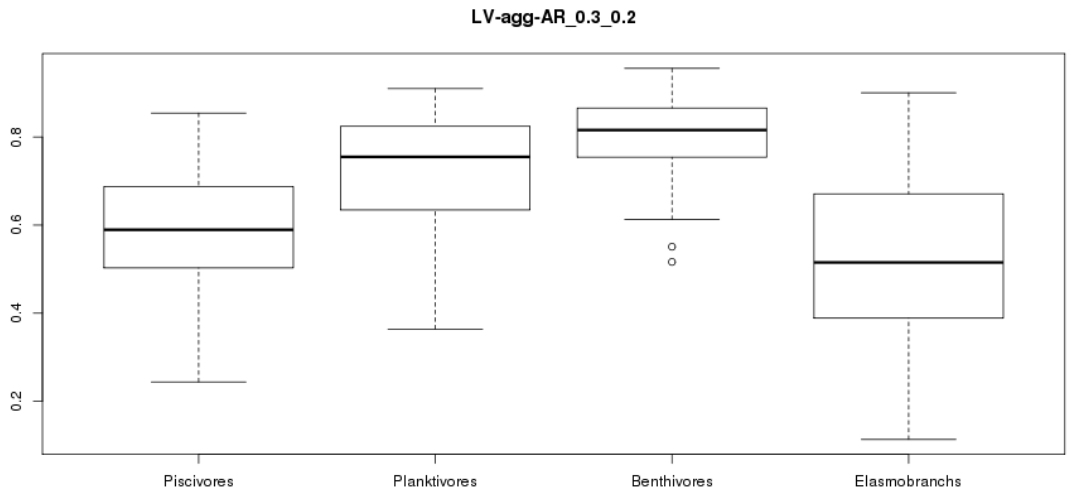
Modeling Efficiency Index
Functional Group: White Noise CV=30%



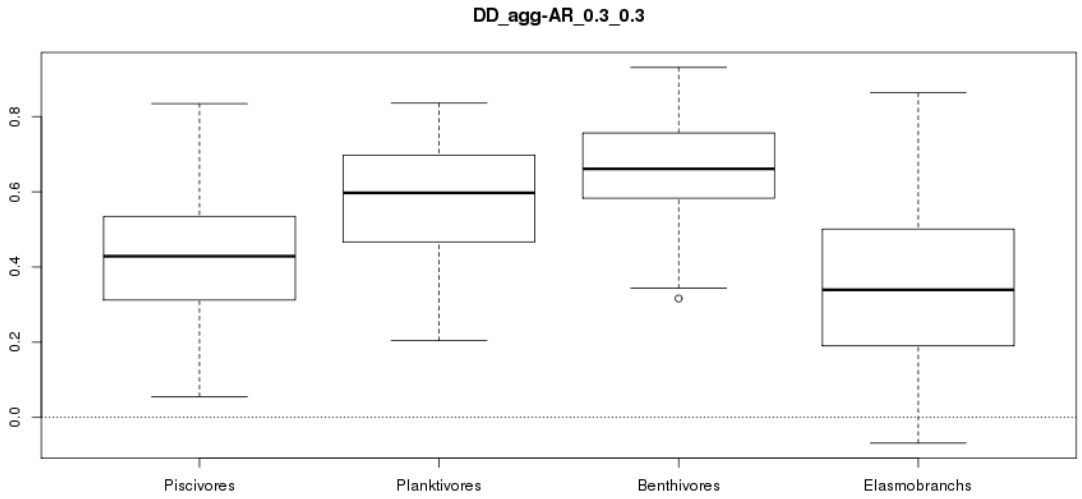


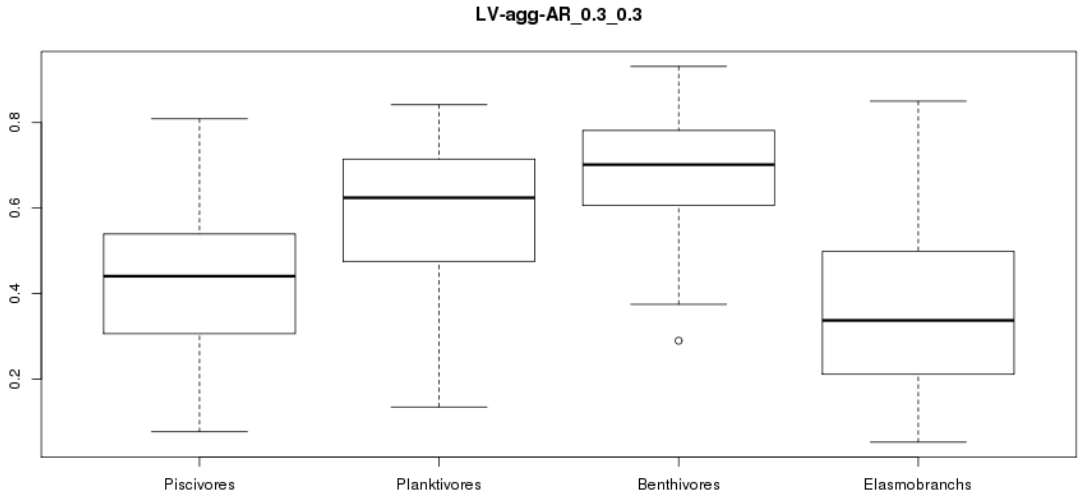
Modeling Efficiency Index
Functional Group: CV=20% AR=0.3



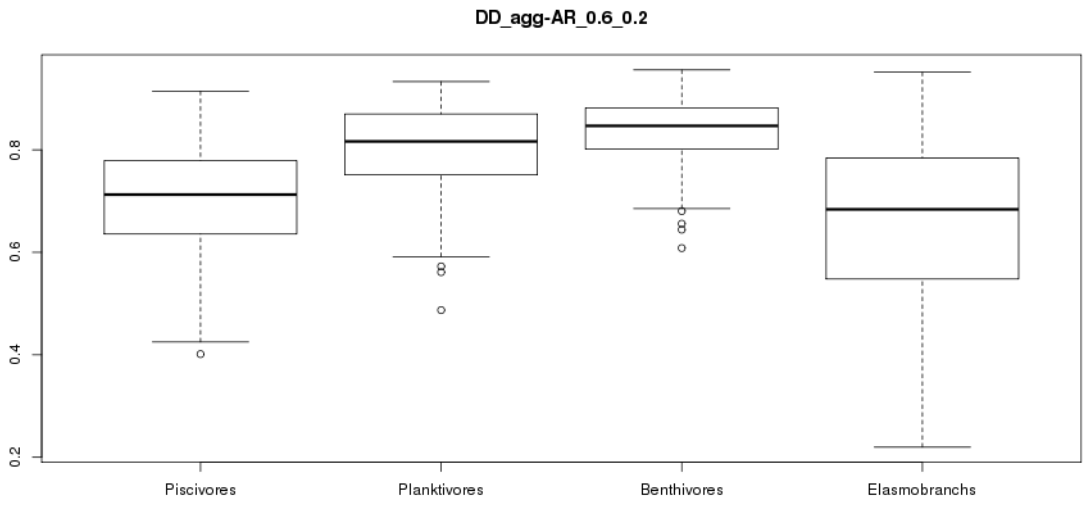


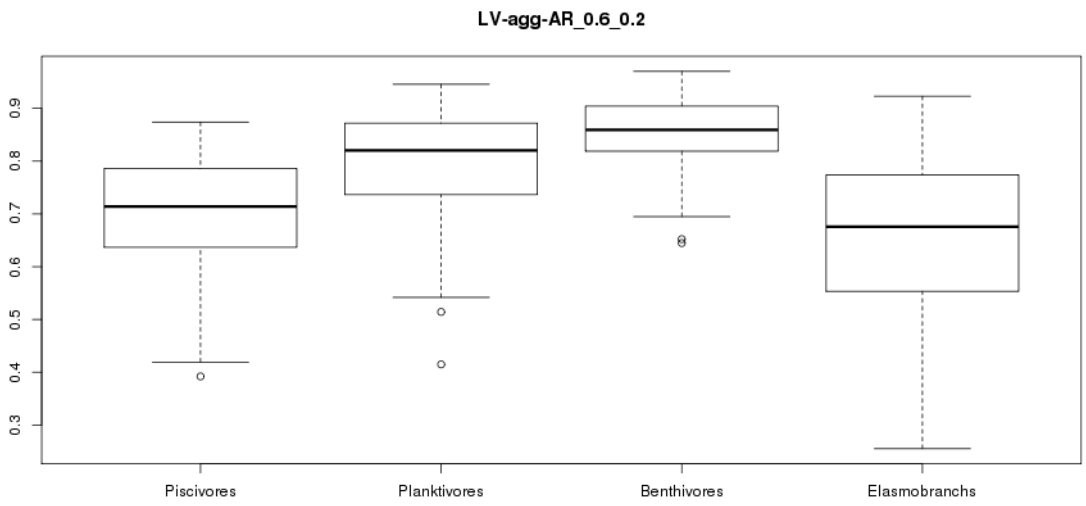
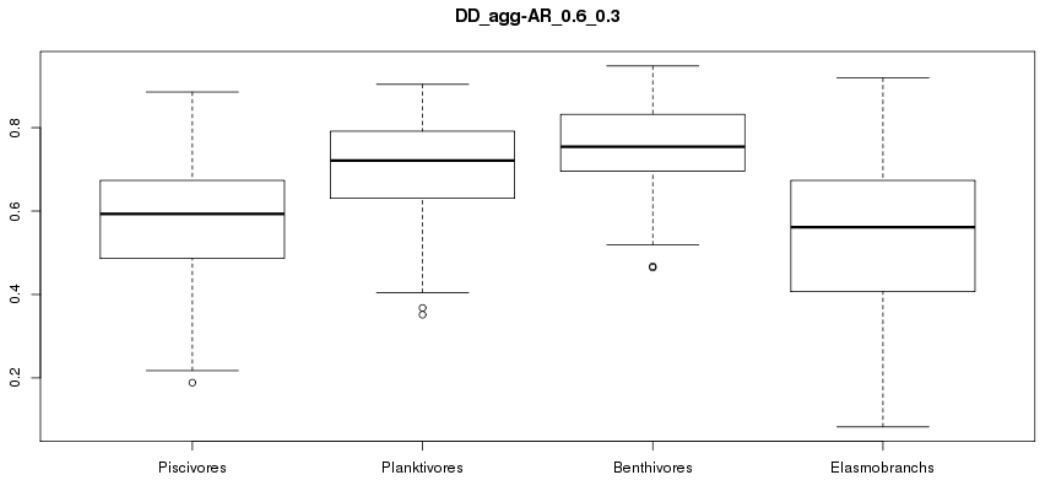
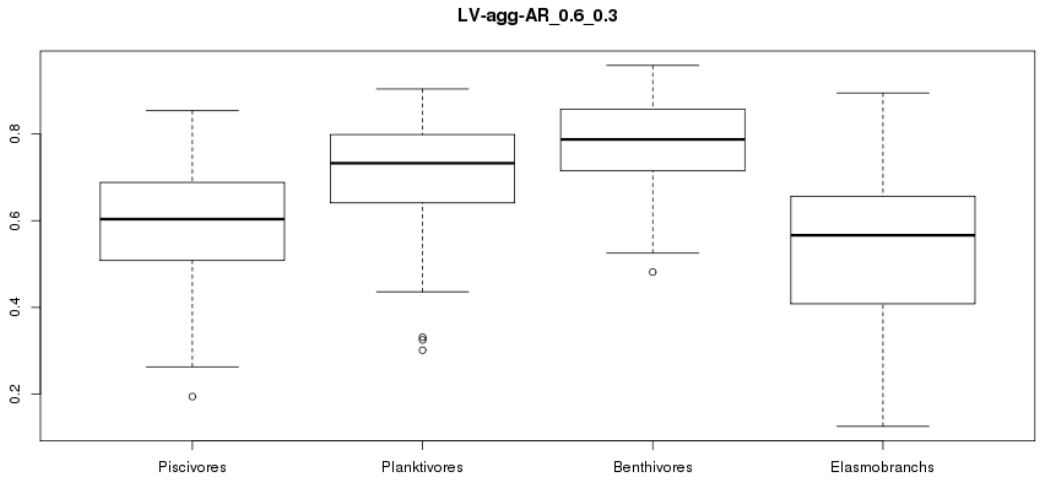
Modeling Efficiency Index
Functional Group: CV=30% AR=0.3





Modeling Efficiency Index
CV=20% AR=0.6





Modeling Efficiency Index
CV=30% AR=0.6