

Carrying capacity results

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2/27/2021

1. Scenarios

In this section, we test how grouping stocks by their carrying capacity affect the profits, biomass and effort allocation. We are considering 3 species/fish have a medium carrying capacity ($K = 100$), and 2 species/fish with higher carrying capacity ($K = 300$) at time zero.

We considered 3 arrangement for the quota baskets:

- *Species with similar K*: we have a QB of normal K and a group of high K.
- *The normal K species predominates in a basket*: we have a QB were the “normal K” species predominates (2 normal K and 1 high K), and the other basket has the remaining species (1 normal K and 1 high K).
- *The high K species predominates in a basket*: we have a QB were the “high K” species predominates (1 normal K and 2 high K), and the other basket has the remaining species (2 normal K).

We are going to compare these arrangements in terms of biomass, efforts, and total profits.

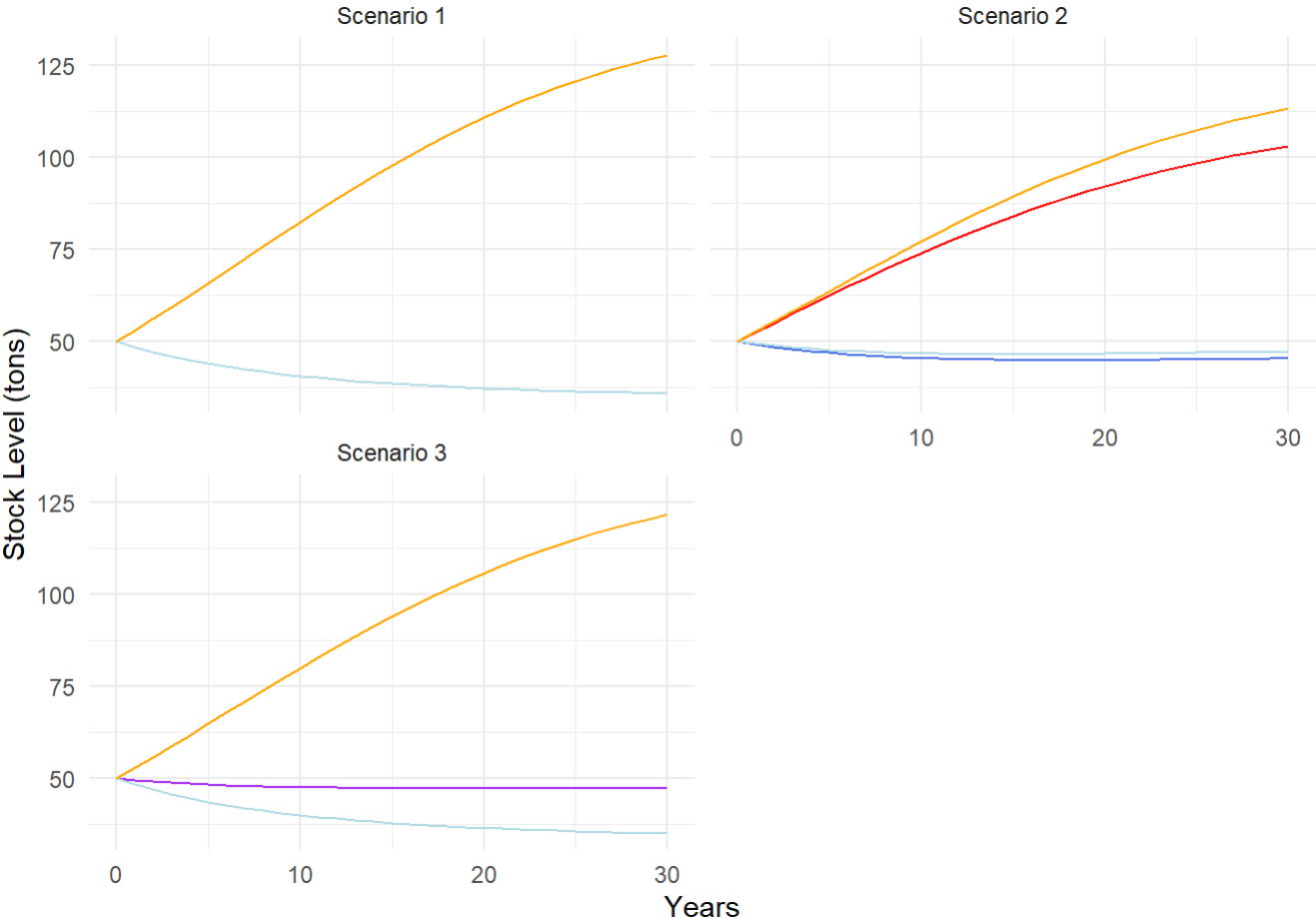
1.1 Parameters

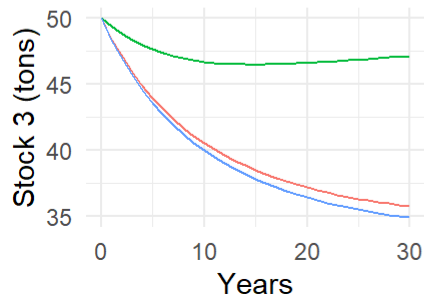
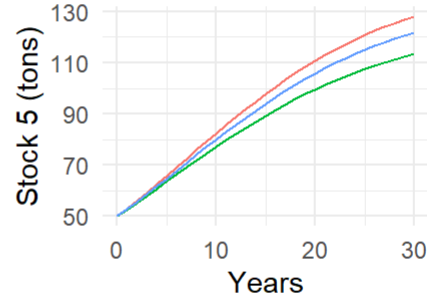
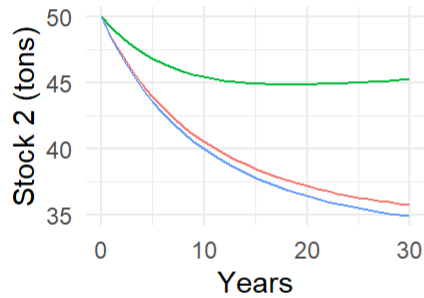
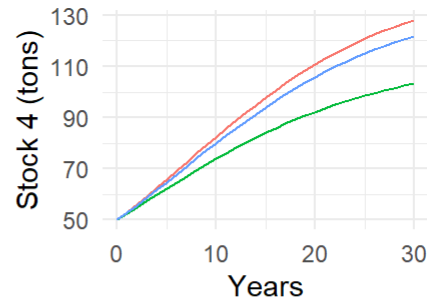
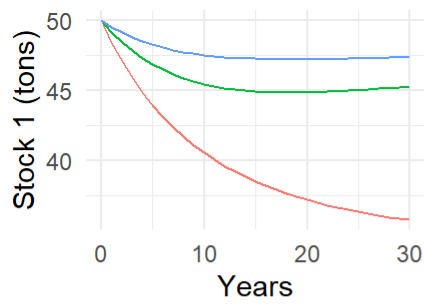
Species	r	K	Starting stock (X)	price
1	0.2	100	50	20
2	0.2	100	50	20
3	0.2	100	50	20
4	0.2	300	50	20
5	0.2	300	50	20

Tech	q1	q2	q3	q4	q5	cost
1	0.04	0.01	0.01	0.01	0.01	1
2	0.01	0.04	0.01	0.01	0.01	1
3	0.01	0.01	0.04	0.01	0.01	1
4	0.01	0.01	0.01	0.04	0.01	1
5	0.01	0.01	0.01	0.01	0.04	1

2. Biomass

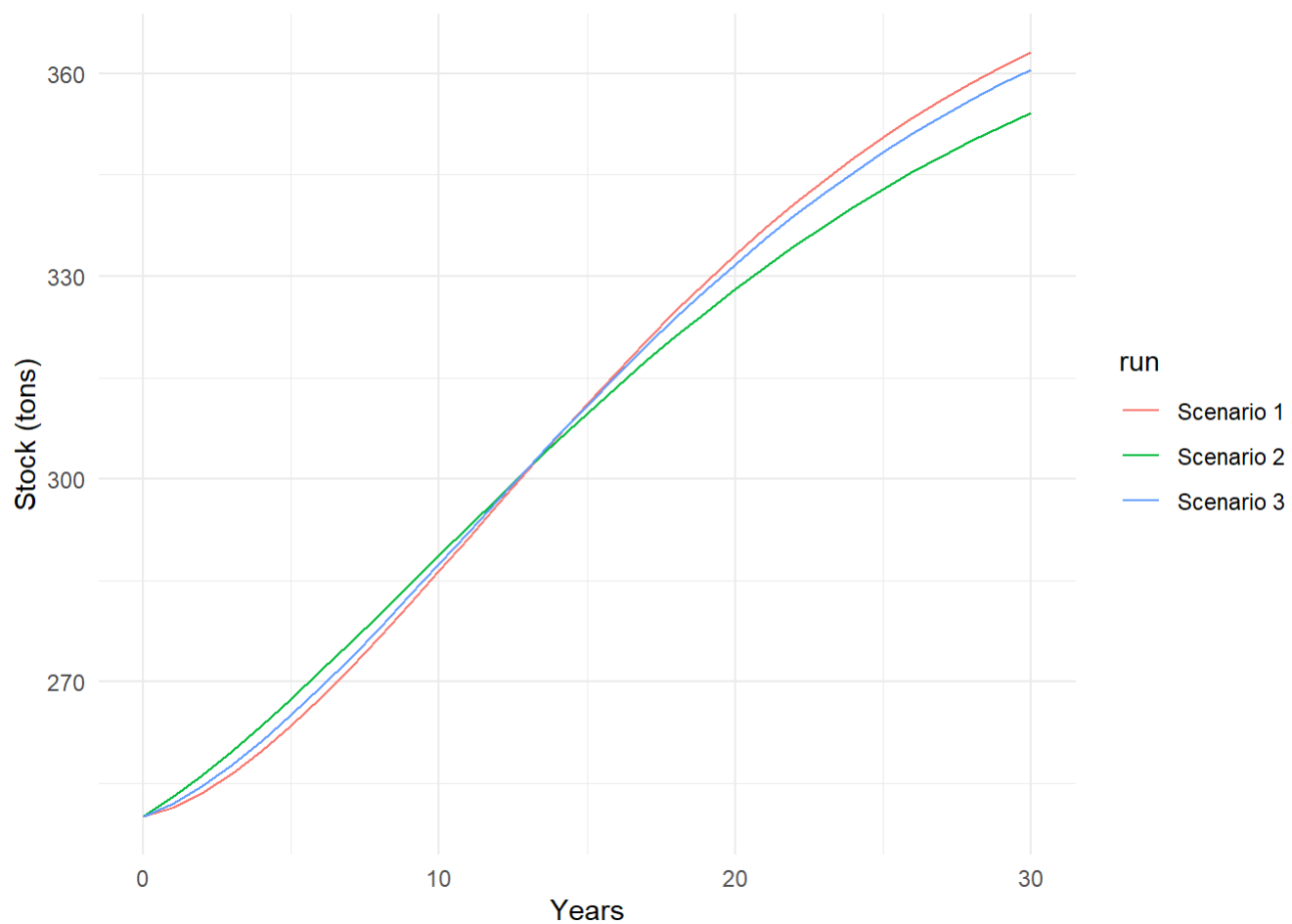
2.1 Biomass per species





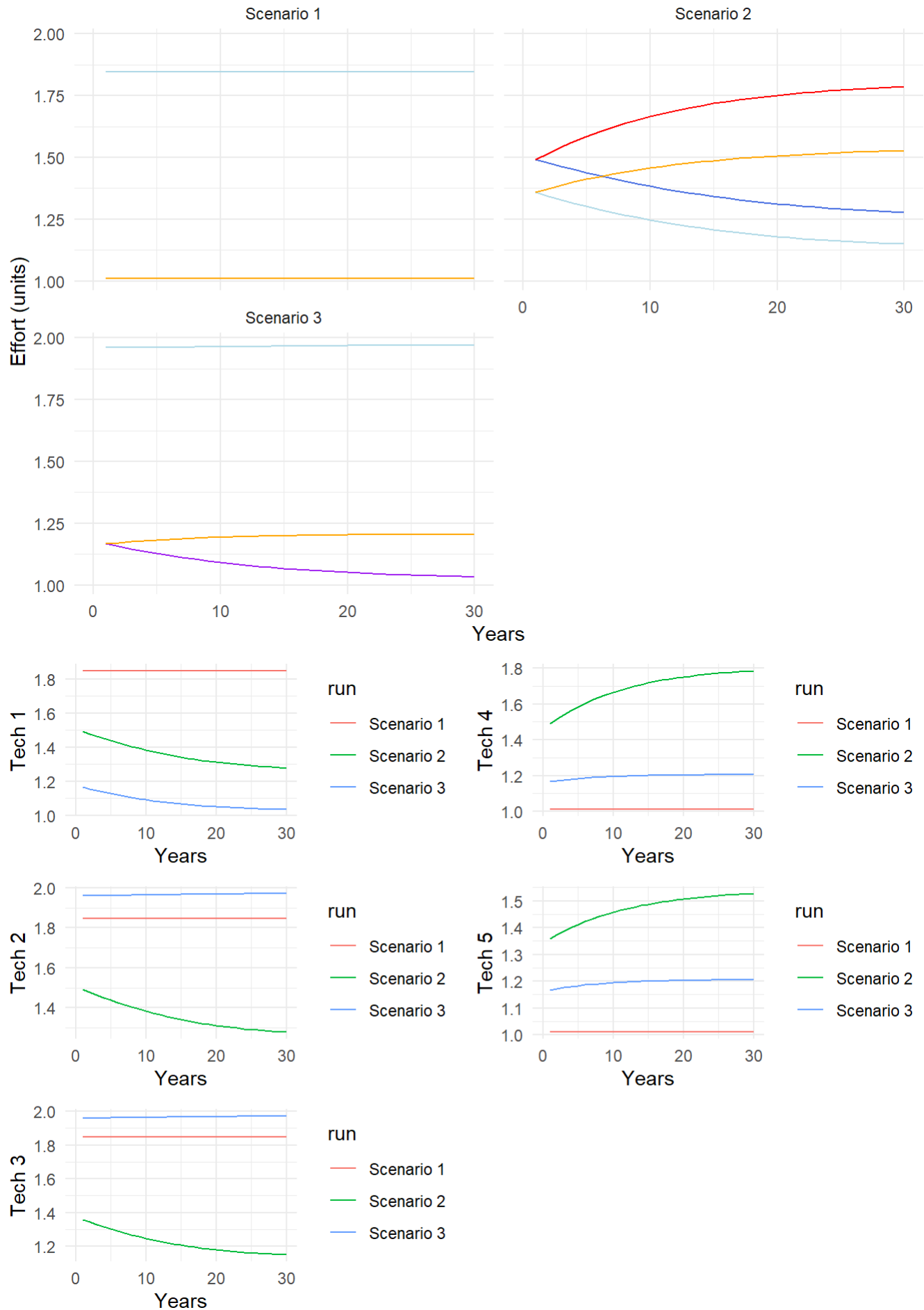
- Holding the rest of the variables constants, grouping only species with low K lead to its stock reduction.
- In all the scenarios, high K species increase over time. A basket of only high K species, provide the best results. Baskets where high k species are not dominant, provide the worst results but their stocks still increase.
- The results for the low k stocks improve if they are combined with high k stocks in the same basket.

2.2 Total biomass in the ocean



- Combined baskets provide better total stocks in the short term, but baskets with dominant high k species provide better long term results.

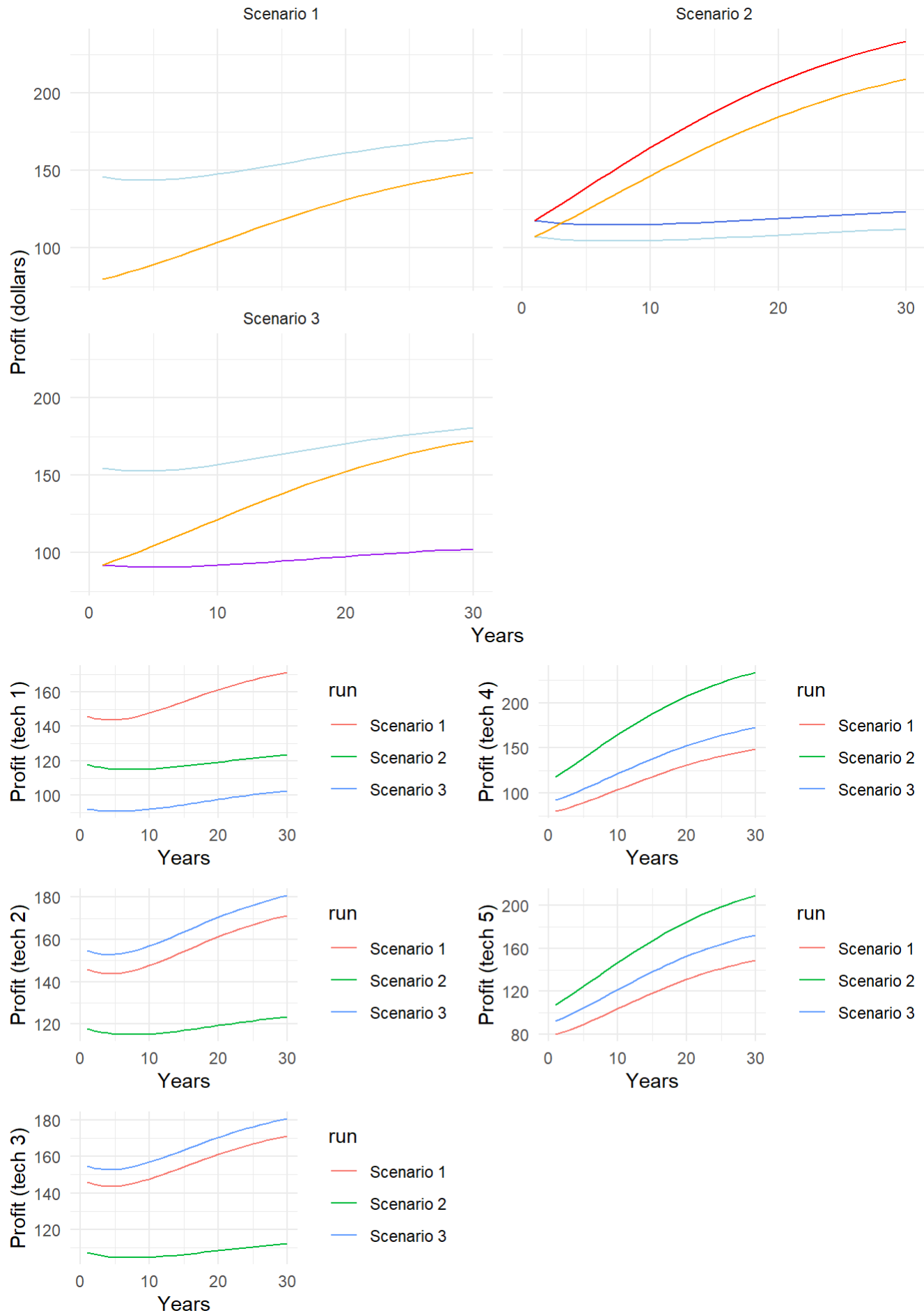
3. Effort



- In Scenario 1 and Scenario 3, the efforts per technology are uniform.
- When low K stocks dominate a basket, the effort that favor their catchability descends. In contrast, the efforts that favor the catch of high K species increases along with its stocks.

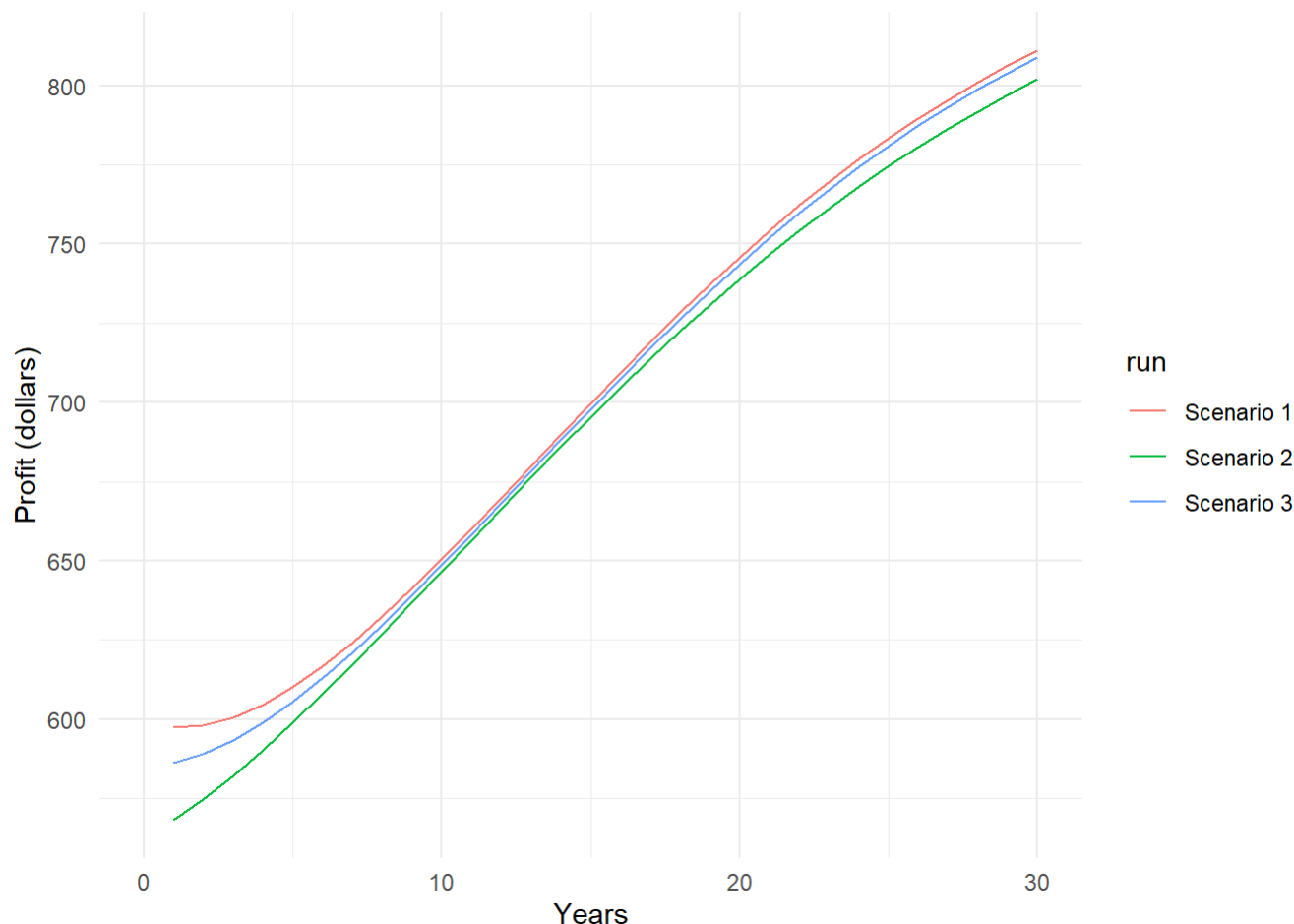
4. Profit

4.1 Profit per technology



- The profits from technologies good at catching low K species increases in baskets with only low K species.
- The profits from technologies good at catching high K species improve in all scenarios, but present better results if they do not dominate any basket.

4.2 Total profit per scenario



- Scenario 1 has the best results in total profits for all the period of analysis.

5. Summary

Stocks

- Holding the rest of the variables constants, grouping only species with low K lead to its stock reduction.
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