

Revision of the harvest control rules (HCRs) for haddock and saithe

Endurskoðun aflareglna fyrir ýsu og ufsa

Þáttakendur:

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6. júní 2025



HAFRANNSÓKNASTOFNUN

Rannsókn- og ráðgjafarstofnun hafs og vatna



What is the goal of a harvest control rule?

Hvert er markmið aflareglna

Harvest control rules (HCRs) generally help management fulfill fisheries policy: maintain high sustainable yield for current fishing and avoid losses to fishing opportunities for future generations.

In Iceland, they are written within the management plans of several species, including cod, haddock, saithe, herring, capelin, ling, tusk, plaice, and Atlantic wolffish.

Advice for other Icelandic stocks use **advice rules** that are not part of a management plan. The International Council for the Exploration of the Seas (ICES) provides guidelines, frameworks, and regular reviews of advice and harvest control rules applied to national or international fisheries. These rules have been designed to follow the ICES MSY approach and be precautionary.

Aflareglur styðja almennt við stjórnun fiskveiða með því að uppfylla stefnu stjórnvalda: að tryggja sjálfbærni og viðhalda háum afrakstri til lengri tíma litið.

Á Íslandi eru slíkar reglur hluti af fiskveiðistjórnun fyrir nokkrar tegundir, þar á meðal þorsk, ýsu, ufsa, löngu, síld, loðnu, keilu, skarkola og steinbít.

Ráðgjöf um aðra íslenskir stofna fylgja ráðgjafarreglum sem eru ekki hluti af formlegri stjórnunaráætlun. ICES veitir leiðbeiningar, ramma og reglubundið mat á ráðgjöf og aflareglum sem notaðar eru í þjóðlegum eða alþjóðlegum fiskveiðum. Þessar reglur hafa verið hannaðar í samræmi við MSY-nálgun Alþjóðahafrannsóknaráðsins (ICES), og eru varfærnislegar í eðli sínu.

What is a harvest control rule?

Hvað er aflaregla?

Harvest control rules (HCRs) are established by the government and are under its authority.

- They increase predictability in quota setting.
- They reduce the risk of moral hazard in decision-making.
- Harvest control rules improve access to international markets through certifications such as IRF and MSC.

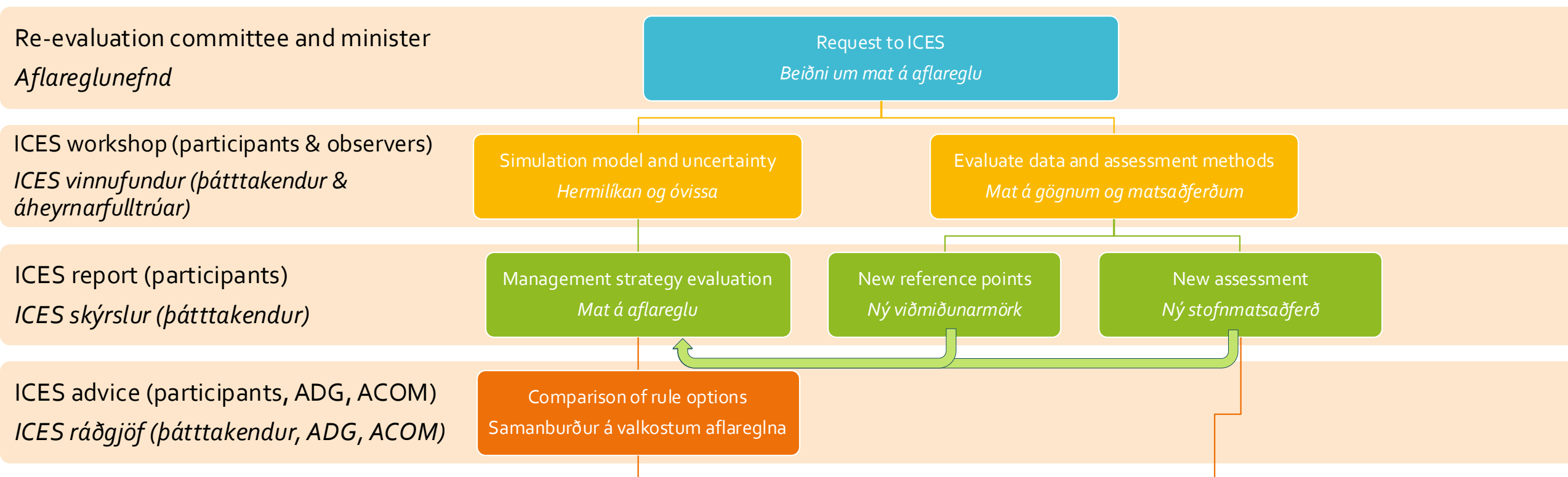
Advice rules are not the same. They do not have formal legal status, and the government can decide on a different quota than the one recommended by Hafrannsóknastofnun/ICES.

Fyrir Ísland eru **aflareglur** settar af stjórnvöldum og eru eign þeirra.

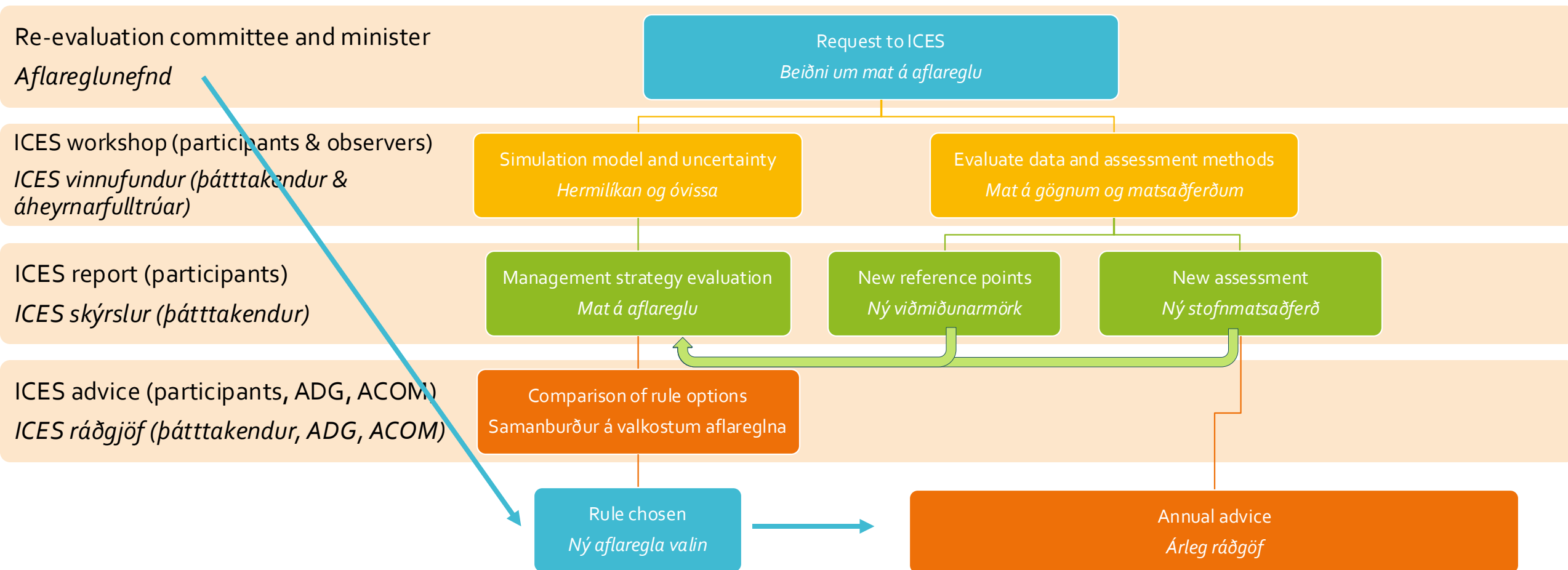
- Eykur fyrirsjáanleika í setningu aflamarks.
- Minnkar líkur á freistnivanda við ákvörðun aflamarks.
- Bætir aðgang að mörkuðum erlendis í gegnum alþjóðalegar vottanir (IRF og MSC).

Ráðgjafareglur eru ekki sama. Þeir hafa ekki formlegu stöðu og stjórnvöld geta því valið annað aflamark en það sem ráðlagt er af Hafrannsóknastofnun/ICES.

The HCR revision process - *Endurskoðunarferli aflareglu*



The HCR revision process - *Endurskoðunarferli aflareglu*



The HCR evaluation request: haddock

Beiðni um mat á aflareglu: ýsa

For all rules 1-5:

$$TAC_{y/y+1} = HR_y \times B_{ref,y} \text{ if } SSB_y \text{ is above } MGT B_{trigger}$$

$$TAC_{y/y+1} = HR_y \times (SSB_y / MGT B_{trigger}) \times B_{ref,y} \text{ if } SSB_y \text{ is below } MGT B_{trigger}$$

where $B_{ref,y}$ is the biomass of haddock of length 45 cm and above, HR_y is set by the candidate HCR and $MGT B_{trigger}$ is assumed to be equal to B_{pa} (currently defined as 49400 t). Here the harvest rate is defined in terms of the reference biomass in the assessment year (y) not advisory year (y+1) as used by the current HCR. For candidate HCR R6, HR is replaced with F_{msv}

R1. Current target HR (from 2021/2022), $HR_y=0.35$ for all years

R2. Former target HR (2014/2015 to 2020/2021), $HR_y=0.4$ for all years

R3. Varying harvest rate depending on stock size. a. $HR_y=0.35$ when $SSB_y > MGT B_{trigger}$ and $SSB_y < 1.5 MGT B_{trigger}$, b. $HR_y=0.4$ when $SSB_y > 2 MGT B_{trigger}$, HR_y increases linearly from 0.35 to 0.4 when SSB_y is between 1.5 and 2 $MGT B_{trigger}$

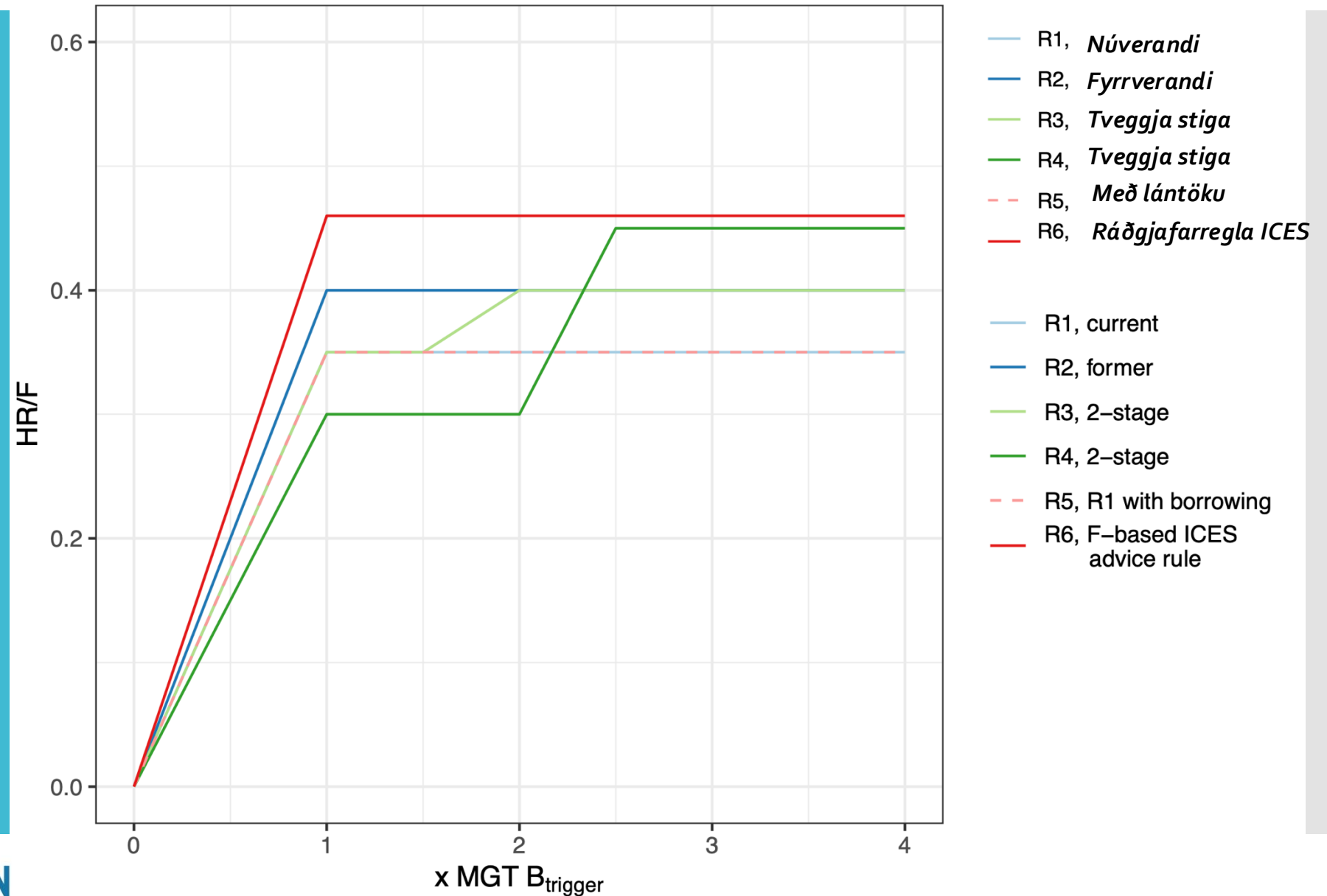
R4. Varying harvest rate depending on stock size. a. $HR=0.3$ when $SSB_y > MGT B_{trigger}$ and $SSB_y < 2 MGT B_{trigger}$, b. $HR=0.45$ when $SSB_y > 2.5 MGT B_{trigger}$, HR_y increases linearly from 0.3 to 0.45 when SSB_y is between 2 and 2.5 $MGT B_{trigger}$

R5. Same as R1 except with a borrowing option for 8000 tonnes which is used on average every 3 years.

R6. ICES MSY-advice rule that uses fishing mortality (F_{msv}) rather than harvest rate.

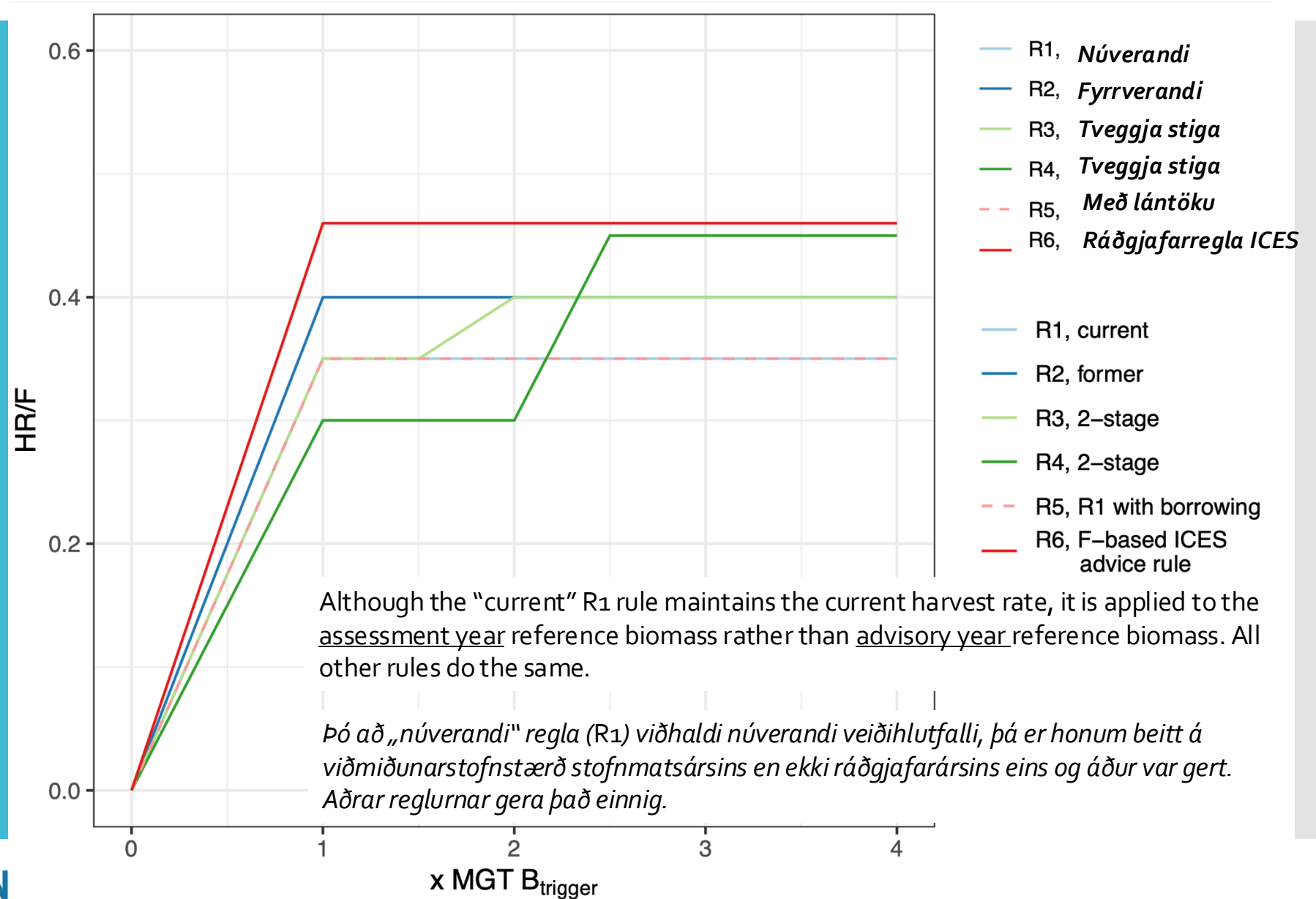
The HCR evaluation request: haddock

*Beiðni um mat á
aflareglu: ýsa*



The HCR evaluation request: haddock

Beiðni um mat á aflareglu: ýsa



The HCR evaluation request: saithe

*Beiðni um mat á
aflareglu: ufsi*

The Ministry requests ICES to evaluate the following three candidate HCRs for saithe in Icelandic waters are precautionary and in accordance with the ICES MSY approach, given the current ICES definition of reference points or any re-evaluation of those points that may occur in the process. Note that for the first two candidate HCRs it is assumed that $TAC_{y/y+1} = HR_{MGT} \times (SSB_y / MGT B_{trigger}) \times B_{4+,y}$ if SSB_y is below $MGT B_{trigger}$. Here $B_{4+,y}$ is the biomass of saithe aged 4 and above and $MGT B_{trigger}$ is assumed to be equal to B_{pa} (currently defined as 61000 t). For candidate HCR #3, HR_{MGT} is replaced with F_{msy} .

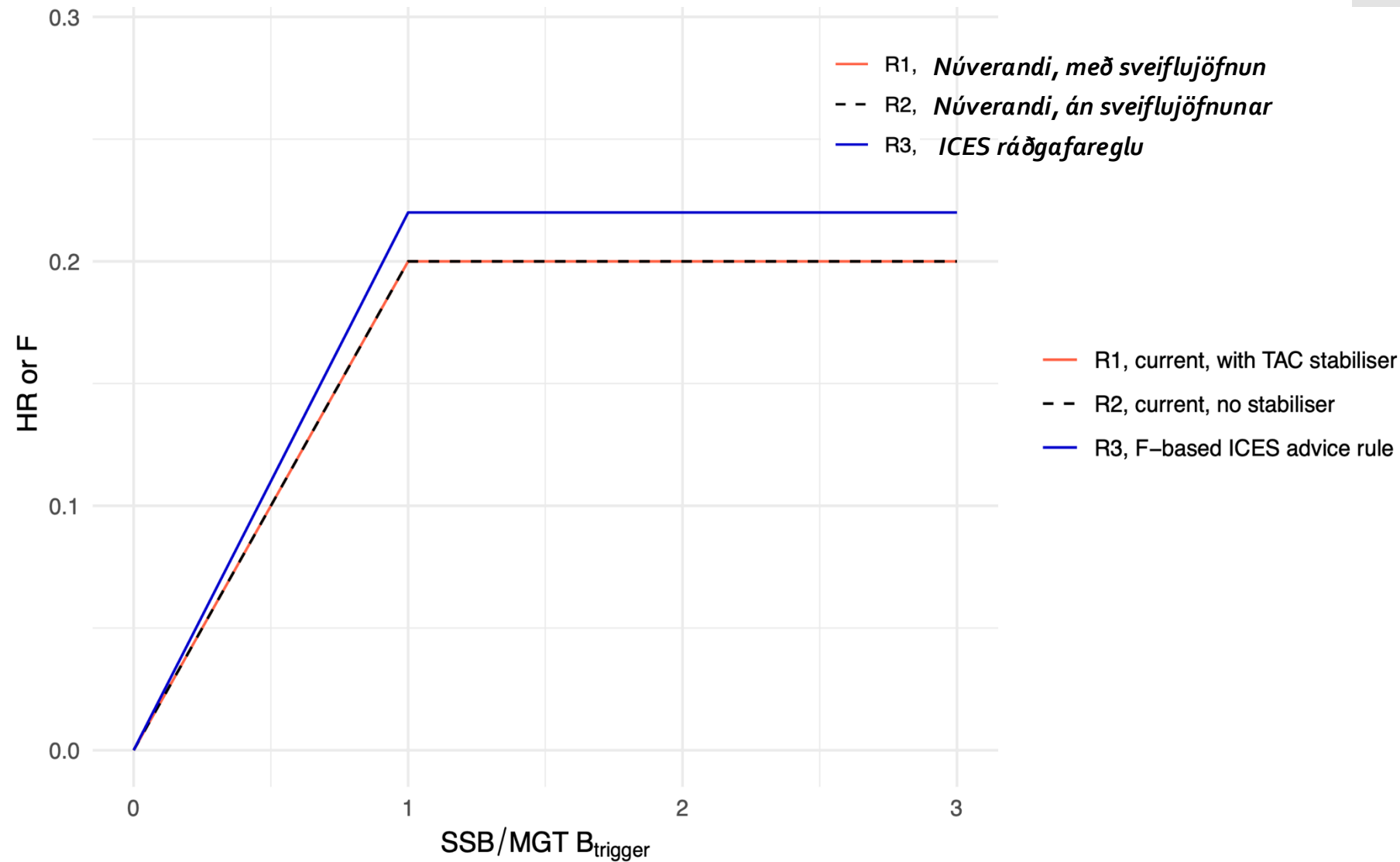
R1. Current HCR (from 2013/2014), $HR_{MGT}=0.2$ and $TAC_{y,y+1} = (HR \times B_{4+,y} + TAC_{y-1,y})/2$

R2. Variant of current HCR (without buffer) $HR_{MGT}=0.2$ and $TAC_{y,y+1} = HR \times B_{4+,y}$

R3. ICES MSY-advice rule that uses fishing mortality (F_{msy}) rather than harvest rate.

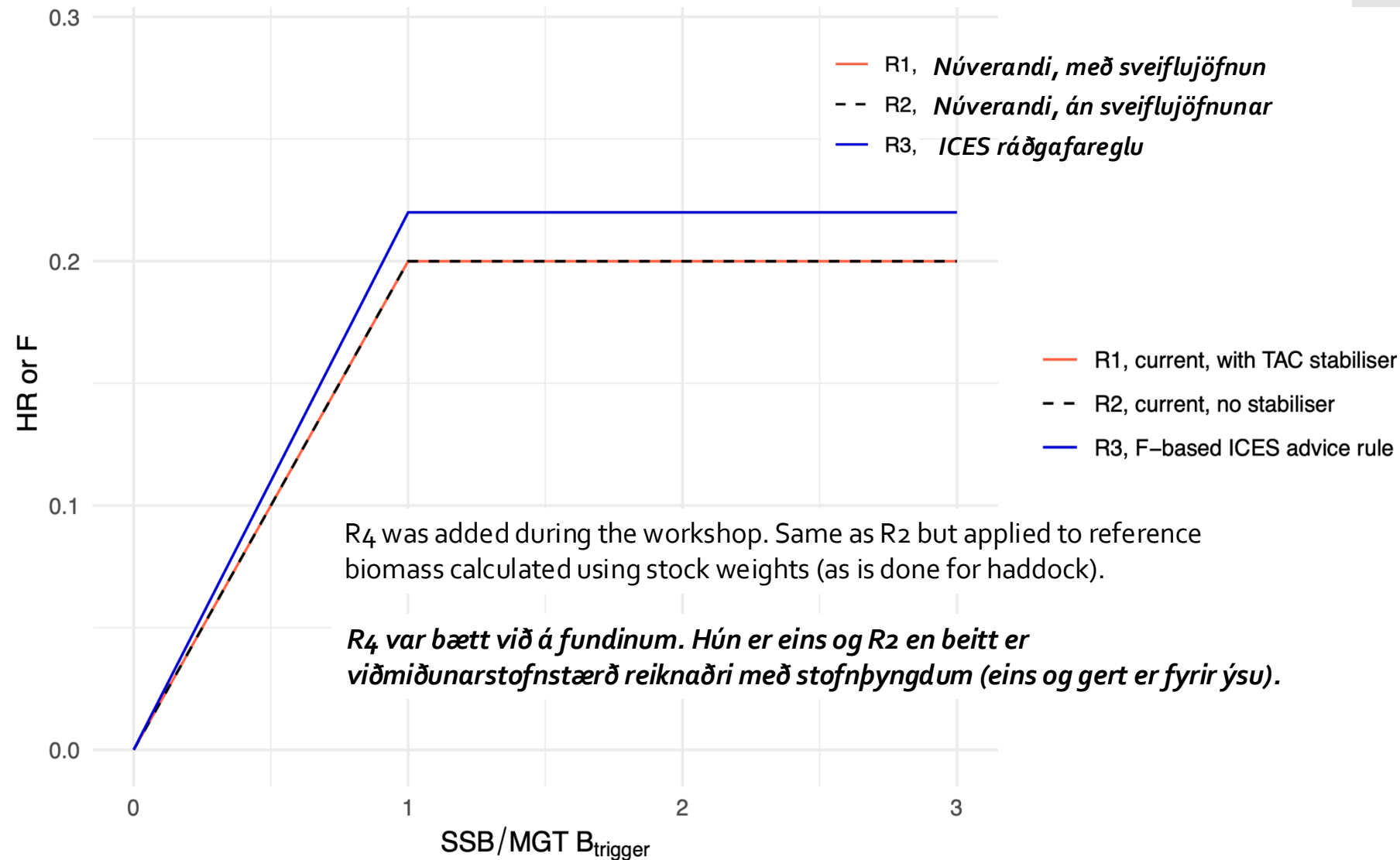
The HCR evaluation request: saithe

*Beiðni um mat á
aflareglu: ufsi*



The HCR evaluation request: saithe

Beiðni um mat á aflareglu: ufsi



ICES advice April 2025

Ráðgjöf ICES apríl 2025

Performance criteria

Catches $\geq 95\%$ MSY. High yield achieved if at least 5% of maximum sustainable yield (MSY) produced in the long term. MSY taken as the maximum resulting from the ICES advice rule.

Probability of SSB falling below B_{lim} was annually $< 5\%$. The HCR was considered **precautionary** if SSB was below B_{lim} less than 5% of the time annually in the long term.

Fishing mortality $\leq F_{MSY}$. In accordance with the ICES MSY approach when the resulting F did not exceed F_{MSY} (from ICES advice rule) in the long term.

Viðmið

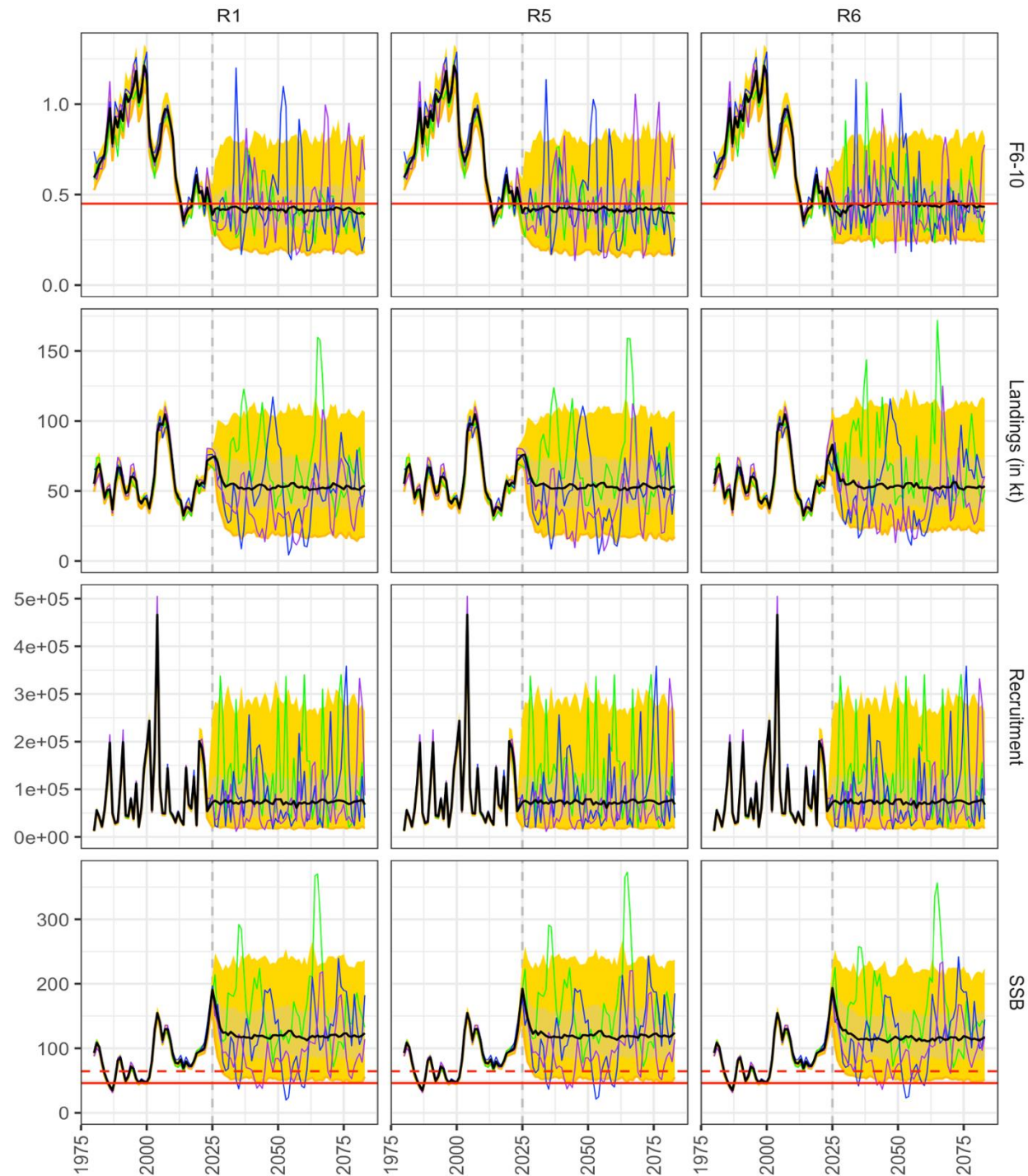
Afli $> 95\%$ af hámarksafrakstri. Meðalaflí til lengri tíma litið að minnsta kosti 95% af hámarksafrakstri (MSY). MSY er skilgreint sem sá hámarksafli sem fæst samkvæmt ráðgjafarreglu ICES.

Líkur á að hrygningarstofn fari undir varúðarmörk $< 5\%$ árlega. Aflaregla talin varfærin ef líkurnar á að hrygningarstofn fari undir B_{lim} eru minni en 5%.

Veiðidánartala $\leq F_{MSY}$. Í samræmi við hámarksafrakstur-nálgun ICES þegar meðalveiðidánartala (F) fór ekki umfram F_{MSY} (eins og skilgreint í ráðgjafarreglu ICES).

ICES advice:
haddock

Ráðgjöf ICES:
ýsa



Fishing mortality
Fiskveiðidánartala

Landings
Afli

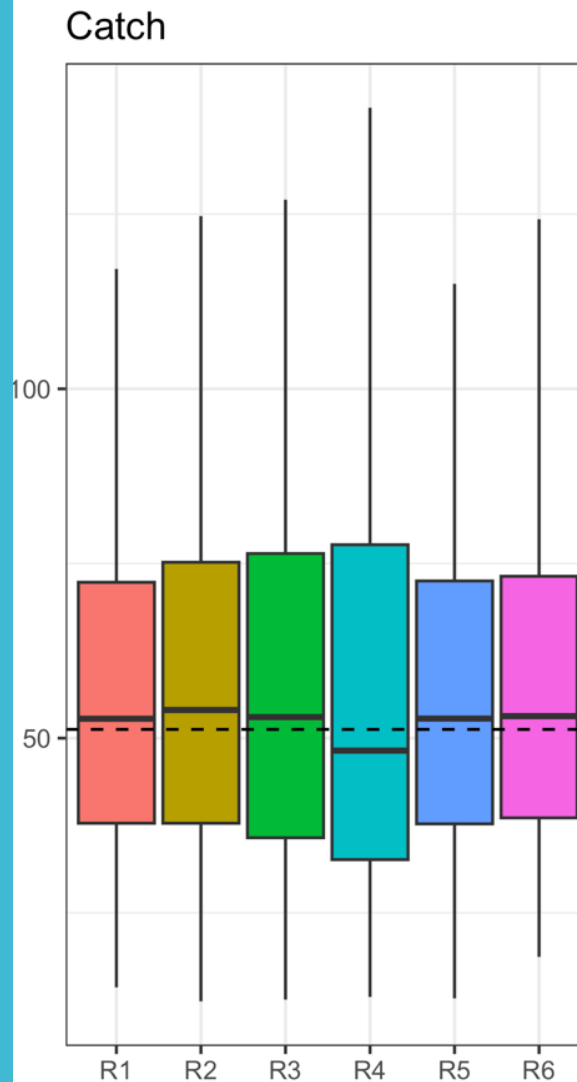
Recruitment
Nýliðun

Spawning stock biomass
Hrygningarstofn

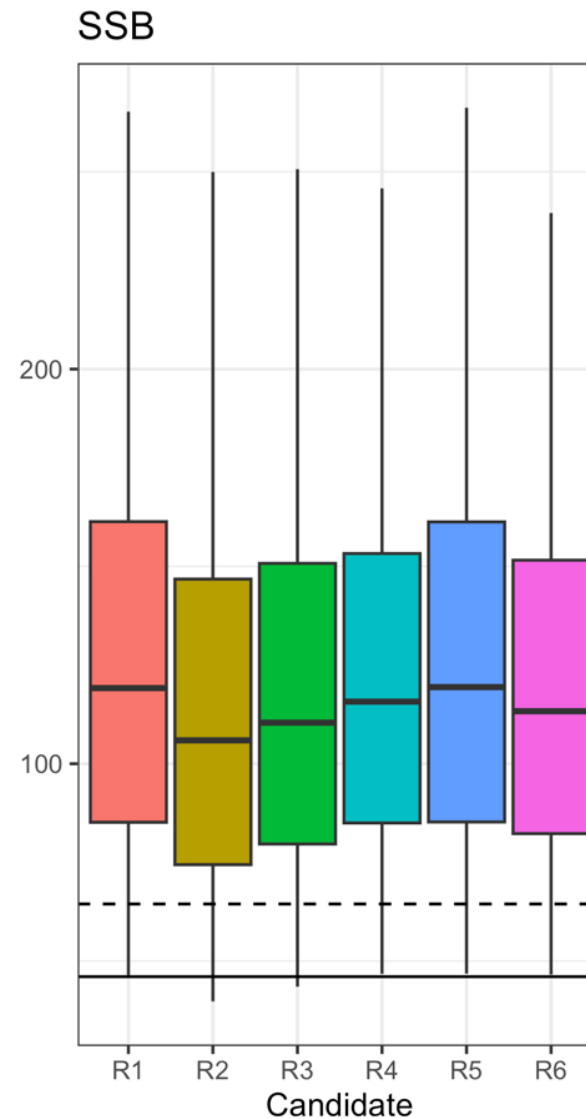
ICES advice:
haddock

Ráðgjöf ICES:
ýsa

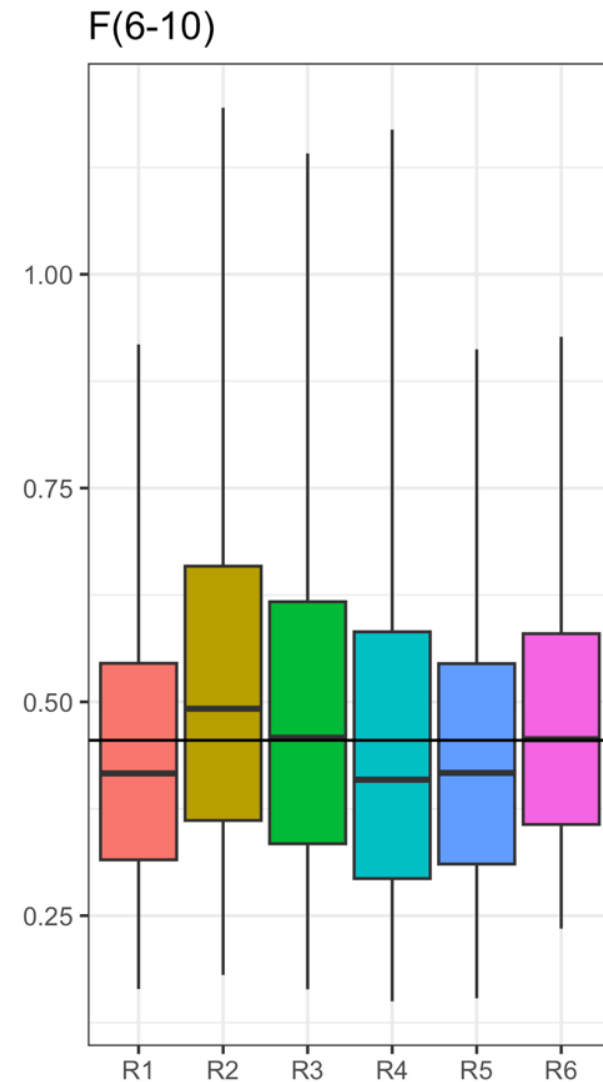
Afli



Hrygningarstofn



Fiskveiðidánartala



ICES advice:
haddock

Ráðgjöf ICES:
ýsa

Rule	HR_{MGT}	Median catch	$P(SSB > B_{lim})$	Annual variation in catch (%)	Precautionary - $P(SSB > B_{lim}) > 5\%$	Long-term $F \leq F_{MSY}$	Long-term yield $> 95\% MSY$
R1	0.35	52.8	0.043	33	Yes	Yes	Yes
R2	0.40	54.0	0.070	36	No	No	Yes
R3*	0.35	53.0	0.053	39	No	No	Yes
R4*	0.30	48.2	0.040	54	Yes	Yes	No
R5	0.35	52.8	0.040	34	Yes	Yes	Yes
R6	0.45**	53.2	0.044	43	Yes	Yes	Yes

* Two-stage HCRs. HCR in the second stage:: R3 = 0.40, R4 = 0.45.

** Target fishing mortality F_{MSY} .

ICES advice: haddock

Ráðgjöf ICES: ýsa

Rule	HR _{MGT}	Median catch	P(SSB > B _{lim})	Annual variation in catch (%)	Precautionary - P(SSB > B _{lim}) > 5%	Long-term F ≤ F _{MSY}	Long-term yield > 95% MSY
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R4*	0.30	48.2	0.040	54	Yes	Yes	No
R5	0.35	52.8	0.040	34	Yes	Yes	Yes
R6	0.45**	53.2	0.044	43	Yes	Yes	Yes

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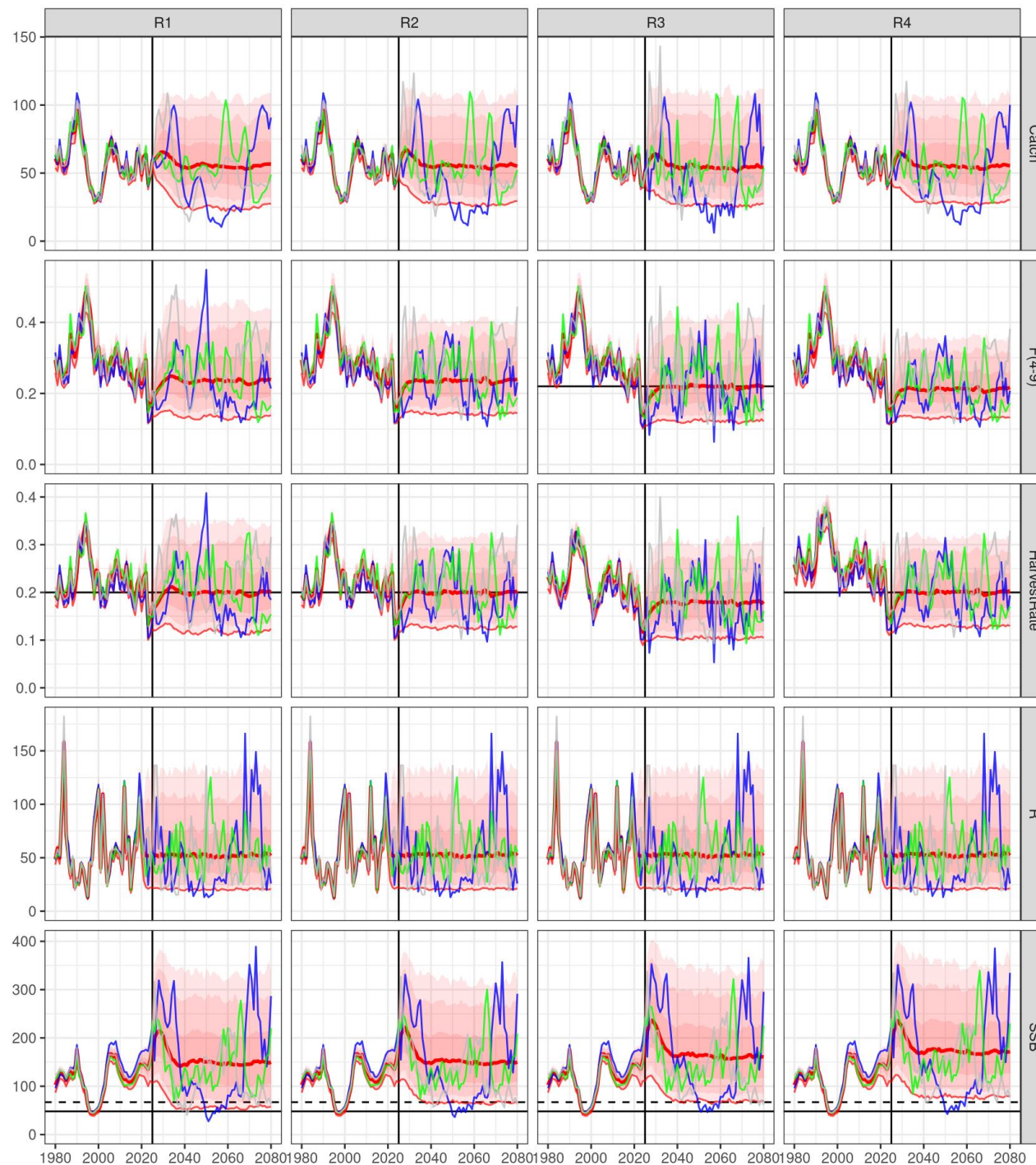
** Target fishing mortality F_{MSY}.

Although the "current" R1 rule maintains the current harvest rate, it is applied to the assessment year reference biomass rather than advisory year reference biomass.

Þó að „núverandi“ regla (R1) viðhaldi núverandi veiðihlutfalli, þá er honum beitt á viðmiðunarstofnstærð stofnmatsársins en ekki ráðgjafarársins eins og áður var gert.

ICES advice:
saithe

Ráðgjöf ICES:
ufsi



Landings
Afli

Fishing mortality
Fiskveiðidánartala

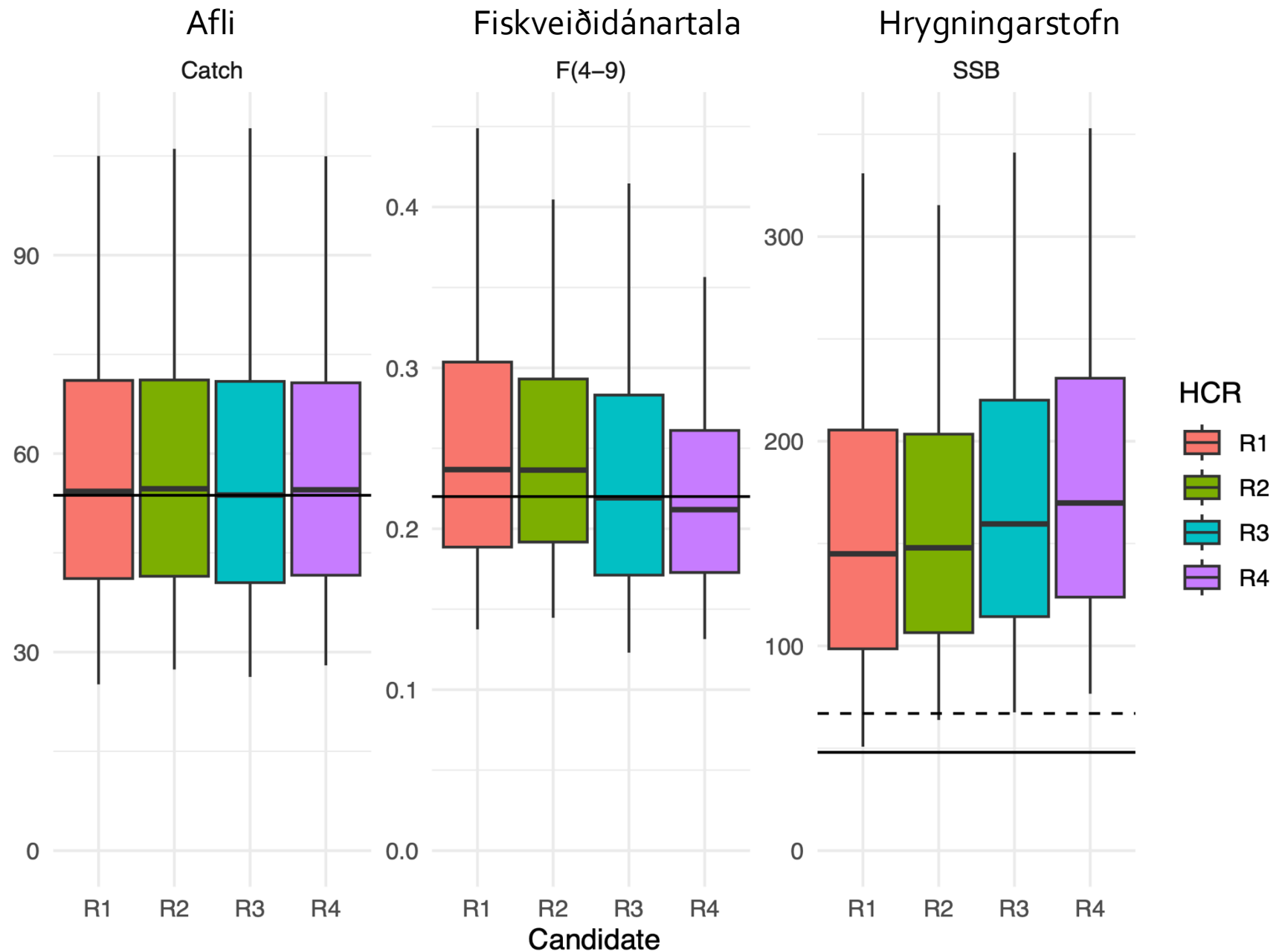
Harvest rate
Veði hlutfall

Recruitment
Nýliðun

Spawning stock biomass
Hrygningarstofn

ICES advice:
saithe

Ráðgjöf ICES:
ufsi



ICES advice:
saithe

Ráðgjöf ICES:
ufsi

Rule	Basis	HR_{MGT} / F_{MSY}	Median catch	$P(SSB < B_{lim})$	Annual variation in catch	Precaut ionary - $P(SSB > B_{lim}) > 5\%$	Long-term $F \leq F_{MSY}$	Long-term yield $> 95\% MSY$
R1	B_{4+} catch weight, with stabilizer	0.20	54.3	0.037	8	Yes	No	Yes
R2	B_{4+} catch weight	0.20	54.7	0.015	11	Yes	No	Yes
R3	Fishing mortality 4-9	0.22	53.7	0.012	15	Yes	Yes	Yes
R4*	B_{4+} stock weights	0.20	54.5	0.007	10	Yes	Yes	Yes

* Not part of the request.

ICES advice:
saithe

Ráðgjöf ICES:
ufsi

Rule	Basis	HR_{MGT} / F_{MSY}	Median catch	$P(SSB < B_{lim})$	Annual variation in catch	Precaut ionary - $P(SSB > B_{lim}) > 5\%$	Long-term $F \leq F_{MSY}$	Long-term yield $> 95\% MSY$
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Questions? *Spurningar?*

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HCR example

Dæmi um aflareglu

A **harvest control rule (HCR)** calculates a target fishing quantity for the upcoming fishing season, based on current information regarding the stock (survey indices or assessments). A simple example could be to multiply a target harvest rate (HR_{MGT}) against a total biomass of a fish stock over age 3 measured in 2025:

$$\text{Target catch in 2026} = HR_{MGT} \times B_{4+, 2025} = 0.2 \times 100\,000 \text{ tonnes} = 20\,000 \text{ tonnes.}$$

Aflaregla (HCR) reiknar aflamark fyrir komandi fiskveiðiár, byggt á fyrirlyggjandi gögnum um viðgang stofns (stofnvísitölur eða stofnmat). Einfalt dæmi væri að festa veiðihlutfall (HR_{MGT}) af lífmassa viðmiðunarstofns (t.d. fiska eldri en 3 ára metið árið 2025):

$$\text{Aflamark árið 2026} = HR_{MGT} \times B_{4+, 2025} = 0.2 \times 100\,000 \text{ tonn} = 20\,000 \text{ tonn.}$$

The HCR revision process

Endurskoðunar- ferli aflareglu

For Iceland, reviews of harvest control rules are made when the government of Iceland requests them from ICES. This most often also includes a re-evaluation of the stock assessment method that is used to inform the HCR. These requests are needed when the HCR is used as the basis of advice as part of a management plan.

This review process occurs in 5 – 7 years intervals.

Fyrir Ísland eru endurskoðanir á aflareglum framkvæmdar þegar íslensk stjórnvöld óska eftir því við Alþjóðahafrannsóknaráðið. Þetta felur oftast einnig í sér endurmat á stofnmatsaðferðinni sem notuð er til að styðja við aflaregluna. Slíkar beiðnir eru nauðsynlegar þegar aflaregla er notuð sem grunnur að ráðgjöf sem hluti af fiskveiðistjórnun.

Þessi endurskoðunarferli fara fram á 5–7 ára fresti.

HCR example

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The harvest rate is often scaled down when spawning stock biomass (SSB) falls below a certain biomass trigger ($MGT B_{trigger}$) value. This feature is meant to encourage growth of SSB and avoid recruitment impairment.

$$\text{If SSB is measured 90\% } MGT B_{trigger} = 0.9, \text{ then } HR = 0.9 \times 0.2 = 0.18$$

Other features may be included such as a stabilizer or banking and borrowing.

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Veiðihlutfallið (HR_{MGT}) er oft lækkað þegar stærð hrygningarstofns fellur undir aðgerðamörk ($MGT B_{trigger}$). Þessu er ætlað að styðja við stærð hrygningarstofns og koma í veg fyrir að nýliðun skerðist.

$$\text{Ef stærð hrygningarstofns er 90\% af } MGT B_{trigger} \text{ er tilsvarandi veiðihlutfall } HR = 0.9 \times 0.2 = 0.18$$

Einnig getur aflaregla tekið tillit til þátta eins og t.d. sveiflujöfnunar og tilfærslu kvóta milli ára.

WKICEGAD 2025

ICES workshop &
report, February

*Vinnufundur ICES
og skýrsla,
febrúar*

- Input data - Inntaksgögn
 - Saithe: minor changes regarding weight and maturity
Ufsi: Minniháttar breytingar varðandi þyngd og kynþroska



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 - Both switched from Muppet to SAM
Báðir fóru úr Muppet yfir í SAM



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- New reference points defined - Ný viðmiðunarmörk skilgreind
 - B_{lim} represents the point below which recruitment impairment can be expected
Varúðarmörk (B_{lim}) táknar þau mörk sem, ef farið er niður fyrir þau, má búast við skertri nýliðun
 - B_{pa} is higher than B_{lim} to include a buffer due to uncertainty. **MGT $B_{trigger}$** used in HCRs is taken from B_{pa}
*Gátmörk (B_{pa}) eru sett hærri en varúðarmörk vegna óvissu. Aðgerðarmörk (**MGT $B_{trigger}$**) sem notað er í aflareglu er byggt á gátmörkum*



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- Management strategy evaluation - Mat á aflareglu
 - **Compares performance of rules**
Ber saman árangur reglna
 - Stocks & fishing simulated 60 years into the future to examine long-term results
Stofnstærð, ásamt veiðum, hermd 60 ár fram í tímann til að skoða langtímaafrakstur.
 - Many forms of uncertainty included (observation, process, and assessment error)
Ýmsir óvissuþættir teknir með (vegna gagna, ferla eða mats)
 - Fishing mortality reference points are created (ICES advice rule)
Viðmiðunarpunktar fyrir fiskveiðidánartölur voru sett (ICES ráðgjafarregla)

