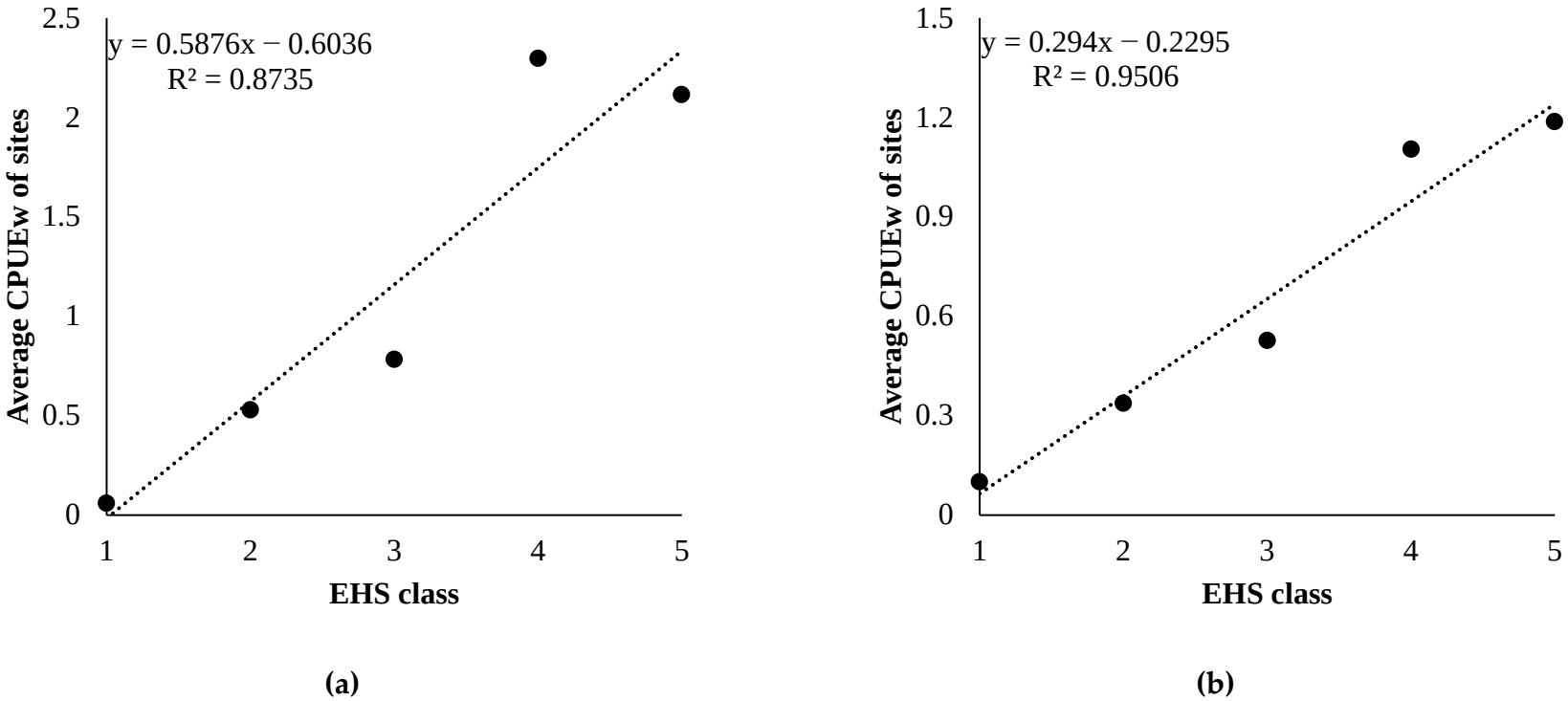
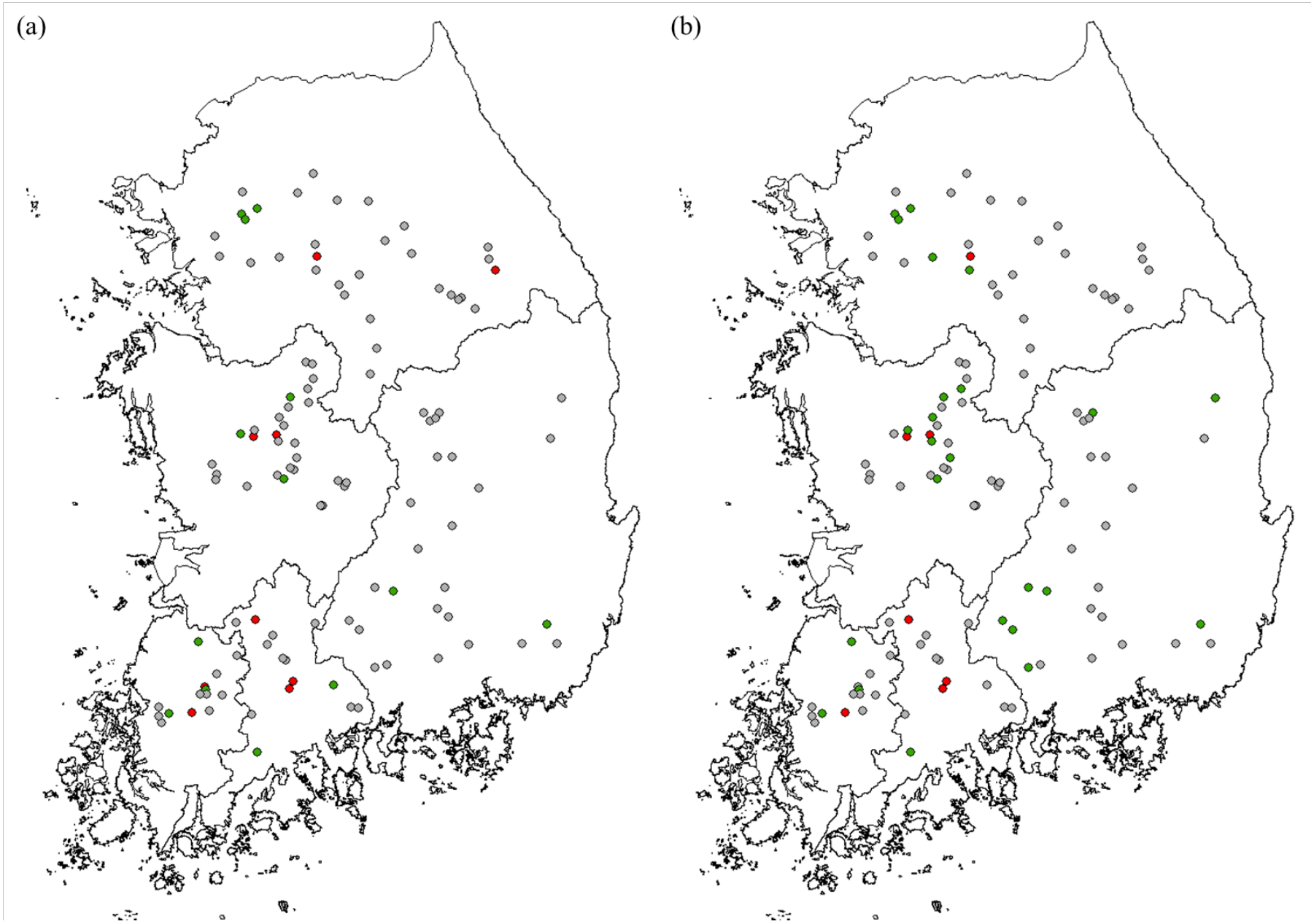
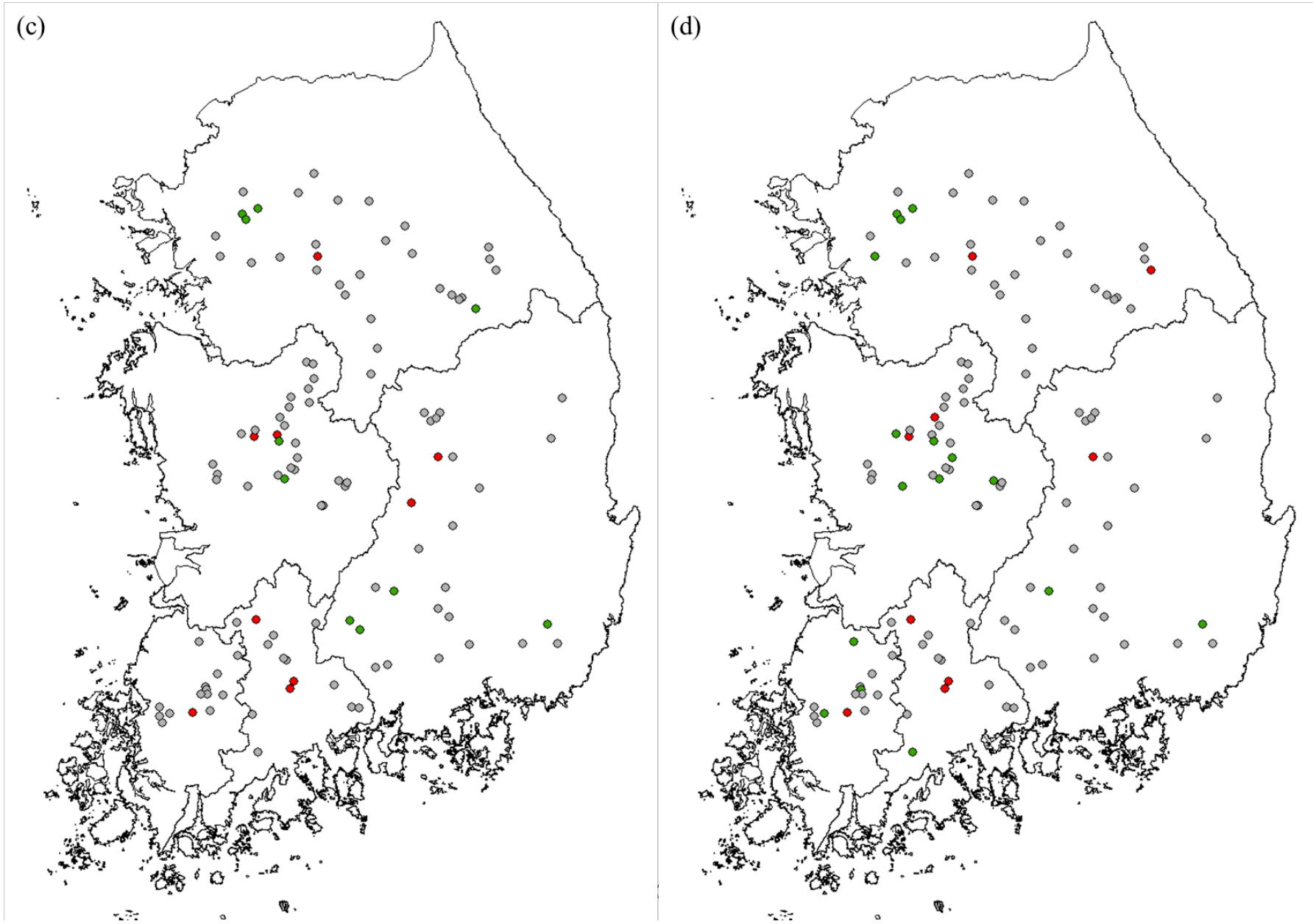


Figure S1. Relationship between ecological habitat suitability (EHS) class and average catch per unit effort normalized by stream width ($CPUE_W$) for (a) *Zacco platypus* and (b) *Nipponocypris koreanus.*


(a)
(b)


(c)
(d)

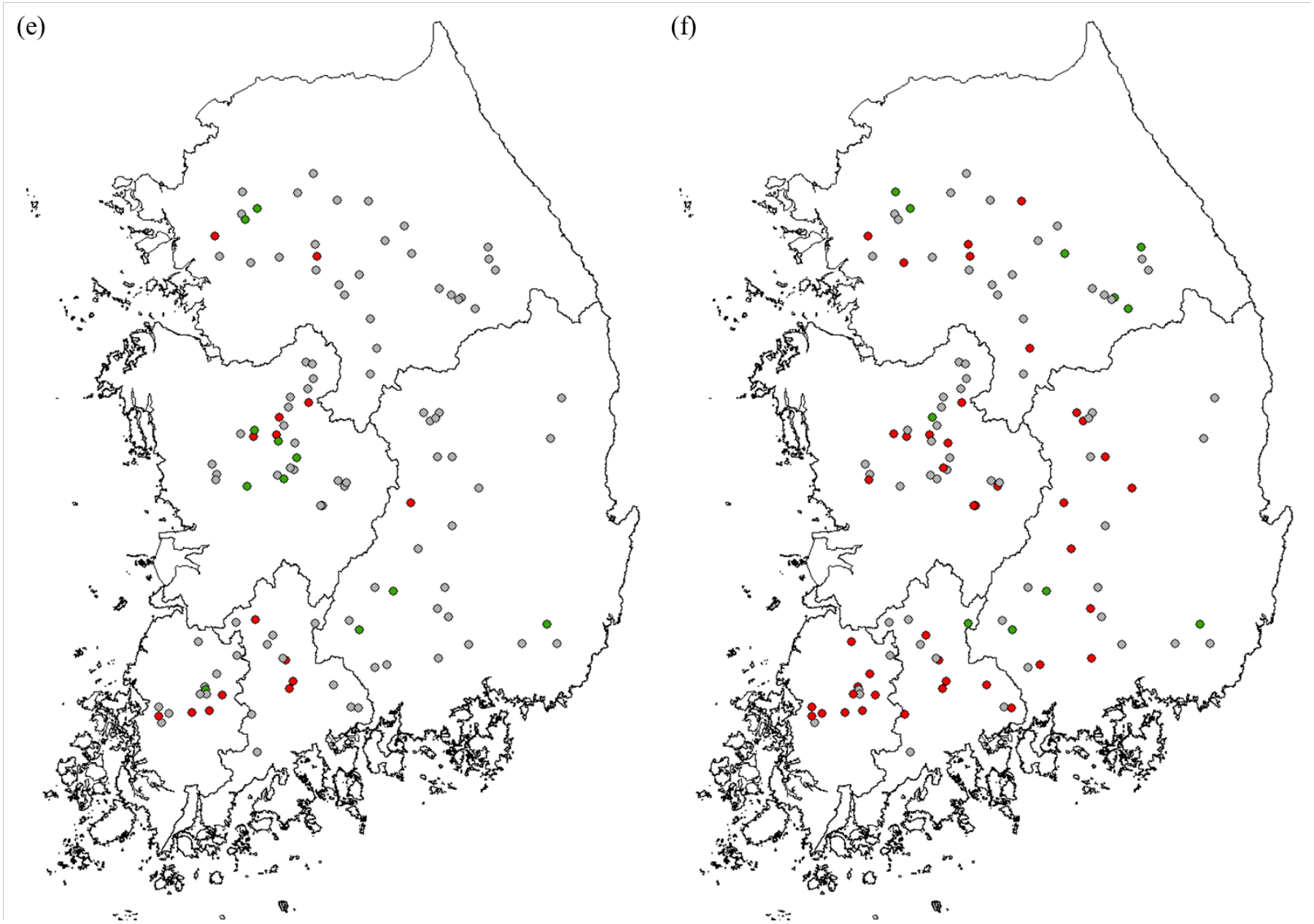
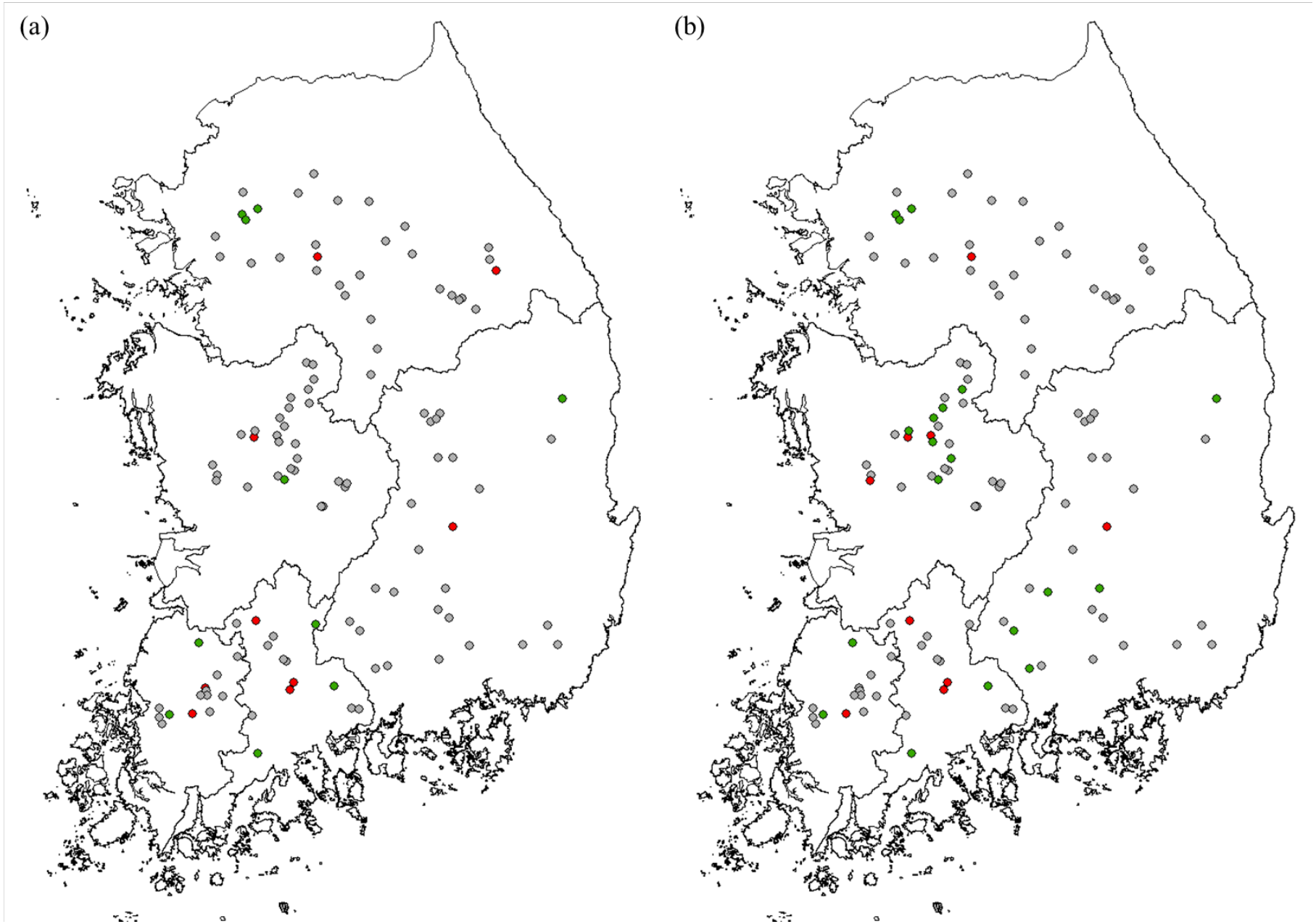
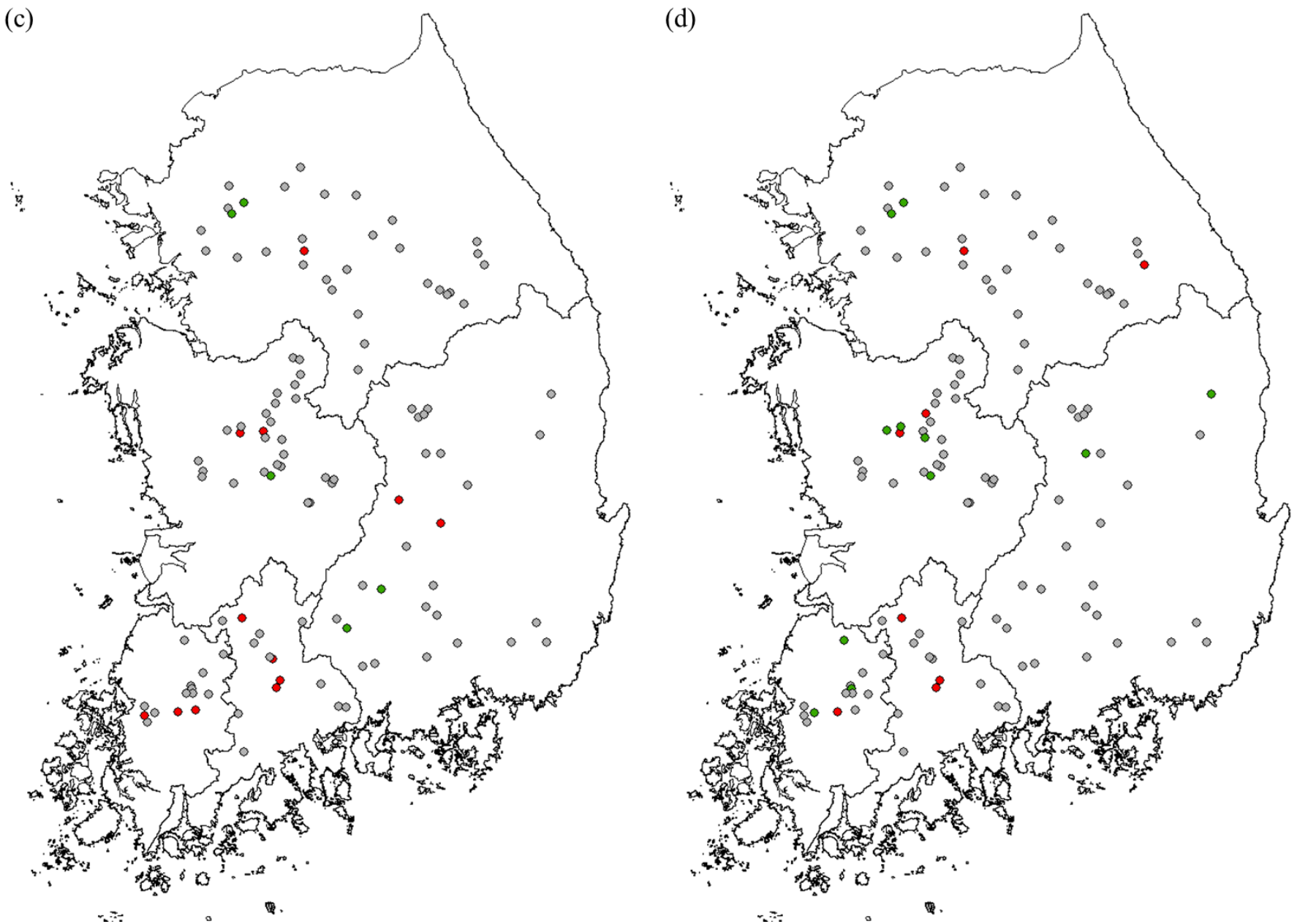

(e)
(f)

Figure S2. Study sites (total 115) where present habitat suitability (EHS) for *Zacco platypus* was significantly different ($p < 0.05$) from future EHS according to ANOVA under RCP 4.5 scenario at (a) 2030 (2026–2035), (b) 2050 (2046–2055), and (c) 2080 (2076–2085) and RCP 8.5 scenario at (d) 2030, (e) 2050, and (f) 2080 (red: decrease, gray: no difference, and green: increase).


(a)
(b)


(c)
(d)

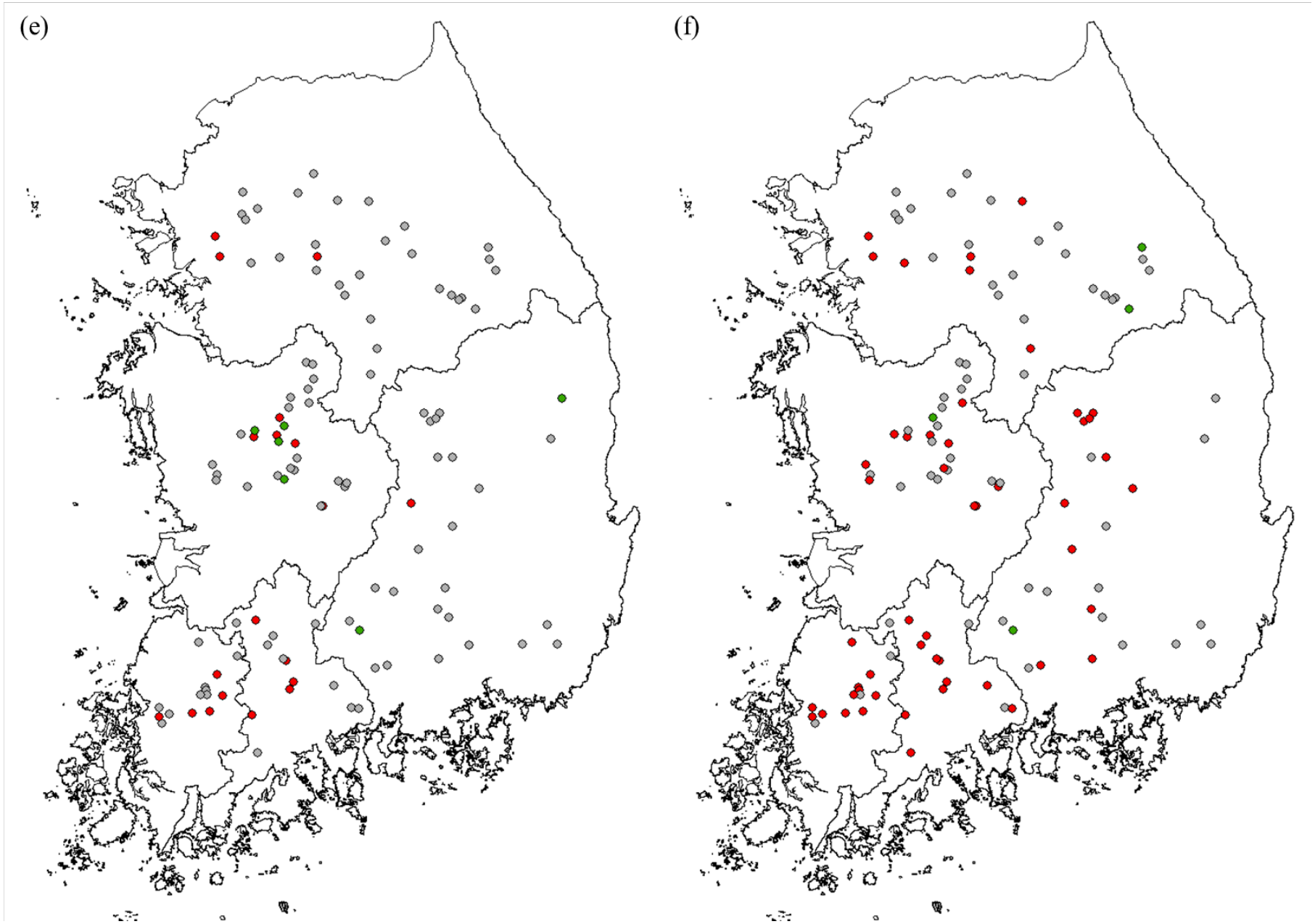

(e)
(f)

Figure S3. Study sites (total 115) where present habitat suitability (EHS) for *Nipponocypris koreanus* was significantly different ($p < 0.05$) from future EHS according to ANOVA under RCP 4.5 scenario at (a) 2030 (2026–2035), (b) 2050 (2046–2055), and (c) 2080 (2076–2085) and RCP 8.5 scenario at (d) 2030, (e) 2050, and (f) 2080 (red: decrease, gray: no difference, and green: increase).

Table S1. Parameters for growth and stress curves of *Zacco platypus* and *Nipponocypris koreanus*.

Parameters		*Z. platypus*	*N. koreanus*
Growth	G0	13.6 °C	12.6 °C
	G1	18.6 °C	16.7 °C
	G2	24 °C	22.2 °C
	G3	27 °C	25.4 °C
Stress	C0	6 °C	6 °C
	CR	0.0675	0.0827
	H0	30 °C	29 °C
	HR	0.0924	0.0959

Table S2. Five ecological habitat suitability (EHS) classes for *Zacco platypus* and *Nipponocypris koreanus*.

Class	*Z. platypus*		*N. koreanus*	
	Range	**Number of sites**	**Range**	**Number of sites**
1	EHS ≤ 0.084	15	EHS ≤ 0.152	4
2	0.084 < EHS ≤ 0.261	21	0.152 < EHS ≤ 0.241	16
3	0.261 < EHS ≤ 0.379	34	0.241 < EHS ≤ 0.315	13
4	0.379 < EHS ≤ 0.469	33	0.315 < EHS ≤ 0.403	17
5	0.469 < EHS	12	0.403 < EHS	4

Table S3. **A**verage and standard deviation (total 115 sites) of hydraulic (HHS) and physiologic (PHS) suitabilities for *Z. platypus* and *N. koreanus* in South Korea at present (2008–2015), 2030 (2026–2035), 2050 (2046–2055), and 2080 (2076–2085). Numbers in the parenthesis indicate percent (%) change compared to present.

Index	Scenario	Period	*Z. platypus*	*N. koreanus*
HHS	RCP 4.5	Present	0.578	0.561
		2030	0.558 (–3.46%)	0.537 (–4.28%)
		2050	0.564 (–2.42%)	0.544 (–3.03%)
		2080	0.554 (–4.15%)	0.535 (–4.63%)
	RCP 8.5	Present	0.582	0.566
		2030	0.559 (–3.95%)	0.540 (–4.59%)
		2050	0.568 (–2.41%)	0.549 (–3.00%)
		2080	0.559 (–3.95%)	0.541 (–4.42%)
PHS	-	Present	0.213	0.155
	RCP 4.5	2030	0.234 (+9.86%)	0.167 (+7.74%)
		2050	0.243 (+14.1%)	0.176 (+13.6%)

	2080	0.232 (+8.92%)	0.163 (+5.16%)
RCP 8.5	2030	0.240 (+12.7%)	0.172 (+11.0%)
	2050	0.210 (–1.41%)	0.143 (–7.74%)
	2080	0.181 (–15.0%)	0.113 (–27.1%)

Table S4. Average growth (GI) and stress (SI) indices for *Zacco platypus* and *Nipponocypris koreanus* at 115 sites in South Korea at present (2008–2015), 2030 (2026–2035), 2050 (2046–2055), and 2080 (2076–2085).

	Scenario	**Period**	***Zacco platypus***	***Nipponocypris koreanus***
GI	-	Present	0.329 ± 0.043	0.294 ± 0.043
	RCP 4.5	2030	0.387 ± 0.040	0.344 ± 0.046
		2050	0.387 ± 0.043	0.346 ± 0.045
		2080	0.371 ± 0.047	0.326 ± 0.047
	RCP 8.5	2030	0.388 ± 0.042	0.343 ± 0.047
		2050	0.366 ± 0.047	0.325 ± 0.045
		2080	0.331 ± 0.055	0.294 ± 0.046
SI	-	Present	0.634 ± 0.161	0.510 ± 0.191
	RCP 4.5	2030	0.595 ± 0.170	0.475 ± 0.197
		2050	0.620 ± 0.157	0.498 ± 0.185
		2080	0.613 ± 0.154	0.484 ± 0.184
	RCP 8.5	2030	0.612 ± 0.161	0.493 ± 0.189
		2050	0.558 ± 0.170	0.421 ± 0.196
		2080	0.524 ± 0.210	0.362 ± 0.234

Table S5. Average values (total 115 sites) of environmental variables ($Flow_{avg}$ = annual average flow, $Flow_{min}$ = annual minimum flow, $Flow_{max}$ = annual maximum flow, Depth= annual depth, Velocity= annual velocity, WT_{avg} = annual average water temperature, WT_{min} = annual minimum water temperature, WT_{max} = annual maximum water temperature, Cold = number of cold days, Hot = number of hot days) in South Korea at present (2008–2015), 2030 (2026–2035), 2050 (2046–2055), and 2080 (2076–2085).

Scenario	Period	$Flow_{avg}$	$Flow_{min}$	$Flow_{max}$	Depth	Velocity	WT_{avg}	WT_{min}	WT_{max}	Cold	Hot*	Hot**
RCP 4.5	Present	19.7	0.201	539	0.465	0.187	15.4	12.1	19.2	111	44.5	62.5
	2030	23.7	0.180	686	0.871	0.194	15.7	12.3	19.7	111	31.2	49.9
	2050	26.2	0.191	790	0.896	0.210	16.2	12.9	20.1	105	36.0	54.8
	2080	29.6	0.182	1124	0.898	0.212	16.6	13.4	20.5	99.8	45.8	65.7
RCP 8.5	Present	19.1	0.198	522	0.831	0.192	15.4	12.1	19.2	111	44.5	62.5
	2030	26.3	0.182	803	0.889	0.204	15.8	12.4	19.7	108	31.0	50.7
	2050	23.9	0.176	645	0.892	0.205	16.6	13.2	20.4	103	50.6	71.5
	2080	26.1	0.170	624	0.904	0.214	17.8	14.5	21.6	87.0	77.5	99.2

* *Zacco platypus*, ** *Nipponocypris koreanus*

Table S6. Median and average water temperatures for *Zacco platypus* and *Nipponocypris koreanus* habitats monitored in South Korea from 2008 to 2016.

Temperature (°C)	***Z. platypus***	***N. koreanus***
Range	7.4–34.4	7.5–33.1
Median	21.6	19.9
Average	21.2	19.8