

Genetic variation between collections of hatchery and wild masu salmon inferred from mitochondrial and microsatellite DNA analyses

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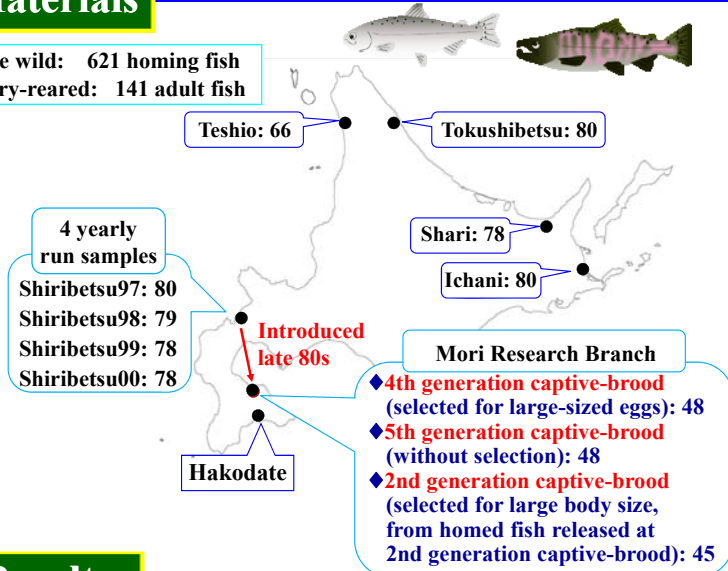
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Objectives

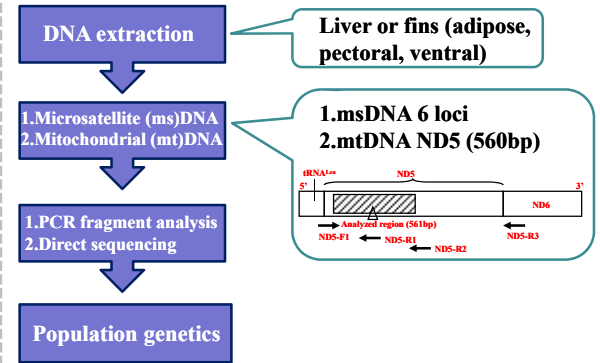
Estimation of genetic diversity in hatchery brood stocks of masu salmon and comparison of such diversity between hatchery and wild salmon to help improvement of their enhancement program

Materials

Putative wild: 621 homing fish
Hatchery-reared: 141 adult fish



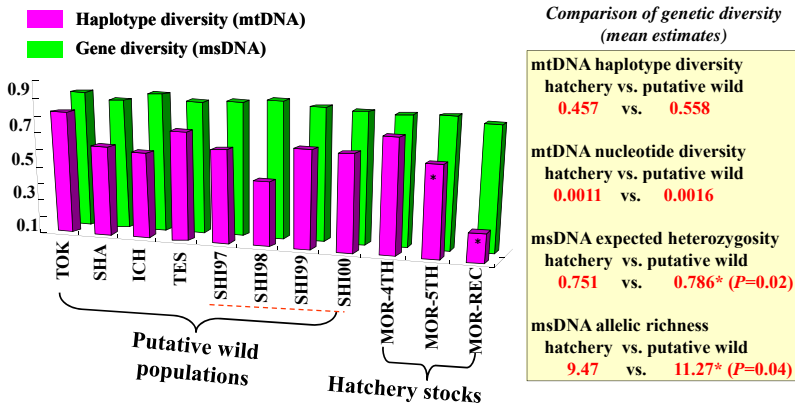
Methods



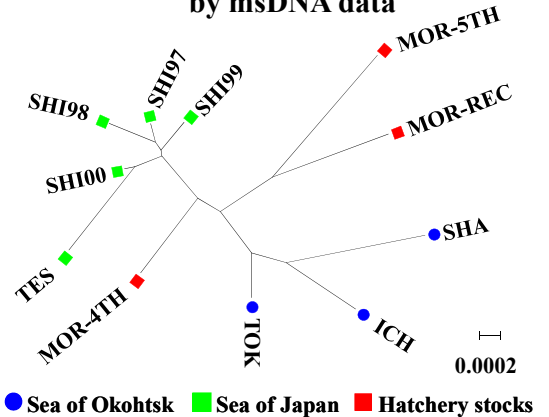
Cited from Yu et al. (2010a, b; 2011)

Results

Genetic diversity of hatchery and putative wild populations of masu salmon



Neighbor-joining population tree by msDNA data



F_{ST} estimates of putative wild populations and hatchery brood stocks of masu salmon (mtDNA, above diagonal; msDNA, below diagonal)

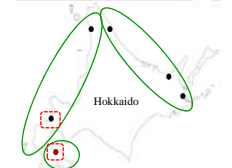
	TOK	SHA	ICH	TES	SHI97-00	MOR-4th	MOR-5th	Rel-Recap
TOK		-0.007	0.079**	0.221**	0.161**	0.226**	0.173**	0.213**
SHA	0.023**		0.072**	0.236**	0.167**	0.241**	0.192**	0.232**
ICH	0.016**	0.026**		0.093**	0.033	0.080**	0.067**	0.097**
TES	0.044**	0.074**	0.052**		0.000	0.080**	0.015	0.003
SHI97-00	0.027**	0.052**	0.029**	0.006**		0.038**	0.000	0.000
MOR-4th	0.035**	0.064**	0.041**	0.015**	0.031**		0.055*	0.034*
MOR-5th	0.043**	0.062**	0.054**	0.045**	0.019**	0.085**		0.132**
Rel-Recap	0.029**	0.049**	0.038**	0.058**	0.037**	0.042**	0.044**	

Statistical significance at $p < 0.005$ (*) and $p < 0.001$ (**) after sequential Bonferroni adjustments. No such significance for 4 yearly collections (SHI97-00) of source population

Analyses of molecular variance (AMOVAs)

Hierarchical structure	mtDNA			msDNA		
	%	Φ	P	%	Φ	P
Analysis I	12.3	0.120	0.000	2.31	0.023	0.000
Analysis II	-0.70	-0.006	0.828	1.53	0.016	0.027

Analysis I : ○ Among SOK, SJP and Mori hatchery
Analysis II : □ Between Shiribetsu River and Mori hatchery



Conclusions

- ◆ Genetic differentiation between regional groups of putative wild masu salmon populations
- ◆ No genetic differentiation among 4 yearly collections of the source population (Shiribetsu River)
- ◆ Rapid loss of the genetic diversity in captive brood stocks to differentiate from source population and other putative wild populations
- ◆ Careful hatchery operations necessary for maintenance of genetic diversity in captive brood stocks and for their release to reduce risks on fitness of wild fish