



ESTABLISHED 1968

The Finest Salmon from
SCOTLAND



Equilibrium Concentration Enhancement (ECE) Calculations

Morrison's Rock, Isle of Benbecula

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Glossary of Abbreviations and Terms

Abbreviation / Term	Definition
ECE	Equilibrium Concentration Enhancement
FCR	Feed Conversion Ratio
FRS	Fisheries Research Scotland (now Scottish Government's Marine Directorate)
kg/m ³	Kilogram per metre cubed
Kg/T-Pro	Kilogram per tonne of production
Kg/yr	Kilogram per year
m ³ /yr	metre cubed per year
MSB	Maximum Stocked Biomass
N	Nitrogen
N/day	Nitrogen per day
OSPAR	The Convention for the Protection of the Marine Environment of the North-East Atlantic (The Oslo and Paris Conventions)
T	Tonne
T/yr	Tonne per Year
µg/l	Microgram per litre

OSPAR Budgets	MSB T	Production T/yr	FCR	Total Feed Input T/yr	N Discharge T/yr	N kg/yr	Kg N/T Production							
Morrison's Rock	5050	4407	1.17	5156.51	254.52	254520.00	57.75							
FRS budget	MSB T	Production T/yr	FCR	Total Feed Input T/yr	Feed [N] T	Fish [N] T	Morts / Esc [N]T	Solid [N] T	Soluble [N] T	Tot waste T/yr	Kg N for Tot Pro	Kg N / Tonne Production	Kg N/day	
Morrison's Rock	5050	4407	1.17	5156.51	371.27	149.99	5.94	55.69	157.05	212.74	212736.94	48.27	582.84	
Black budget	MSB T	Production T/yr	FCR	Total Feed Input T/yr	Feed [N] T	Fish [N] T	Morts / Esc [N]T	Solid [N] T	Soluble [N] T	Tot waste T/yr	Kg N for Tot Pro	Kg N / Tonne Production	Kg N/day	
Morrison's Rock	5050	4407.27	1.17	5156.51	412.52	111.38	8.25	94.88	198.01	292.89	292889.72	66.46	802.44	

FRS	Feed	Fish	Morts	Solid Waste	Diss Waste
N content	7.20	40.40	1.60	15.00	42.30
BLACK et. al.,	Feed	Fish	Morts / Escapes	Particulate	Soluble
N content	8	27	2.00	23.00	48.00

ECE = S*M/Q

M = total consented biomass (T);

Q = flushing rate (m³/yr);

S=source rate = total discharge of N, kg N/T production

Site	MSB T	Budget	N Discharge (kg/T-Pro)	Flushing Rate (m ³ /yr)	ECE kg m ³	ECE ug L	% ECE of UKTAG Background Level
Morrison's Rock	5050	Black	66.46	78,614,099,093.41	0.000004269	4.27	2.54
	5050	OSPAR	57.75	78,614,099,093.41	0.000003710	3.71	2.21
	5050	FRS	48.27	78,614,099,093.41	0.000003101	3.10	1.85
Average						3.69	2.20

$$\text{Flushing Rate: } \frac{(365 \text{ days} * \text{Volume m}^3)}{\text{Flushing time days}}$$

10 km ² Box (Little Colonsay)	
Parameters	Values
Mean Low Water Springs (MLWS) Area (m ²)	9,471,464.09
Minimum Depth (m)	0.90
Maximum Depth (m)	105.00
Mean (m)	22.74
Flushing Time (days)	1.00
MLWS 10 km ² Box Volume (m ³)	215,381,093.41
Flushing Rate (m ³ /yr)	78,614,099,093.41