

3D Physical Modelling Study Lubec breakwater - USA	
Sample Properties (Prototype)	
Number of Samples:	210
Total Sample Weight:	2 715.0 kg
Minimum Weight:	- kg
Maximum Weight:	42.6 kg
Average Weight:	8.1 kg
Median Weight:	7.7 kg
M_{50} :	14.8 kg

Item	% Passing	5-40 kg
EUL	97%	80
NUL	70%	40
$W_{em}(Up)$	50%	20
M_{50}	50%	15
$W_{em}(Low)$	50%	10
NLL	10%	5
ELL	5%	1.5
Γ_{RRM}		1.74

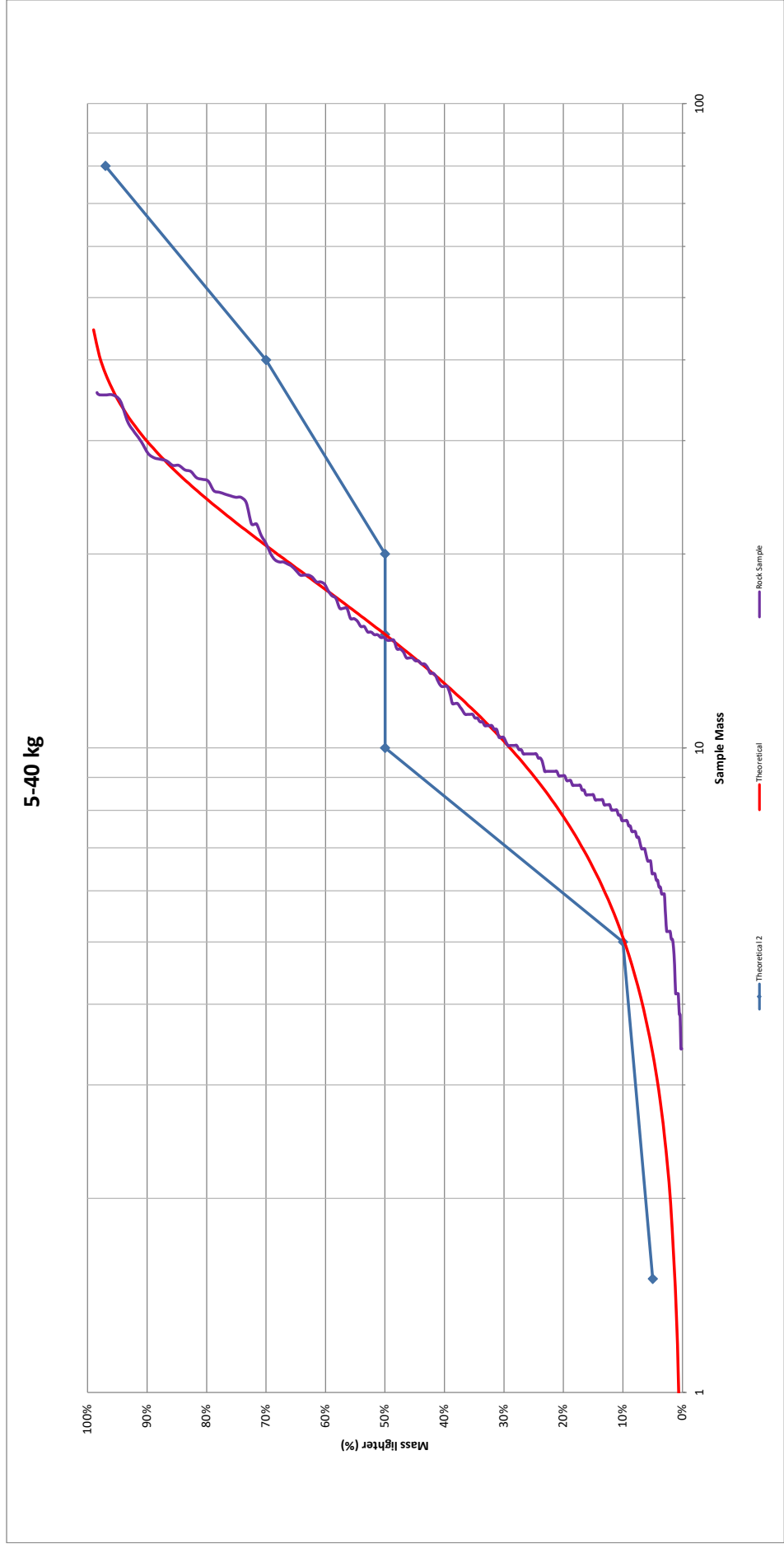
Material Densities	
$\rho_{a,b}$	= 2 600 kg/m ³
$\rho_{a,h}$	= 2 600 kg/m ³
$\rho_{w,b}$	= 1 025 kg/m ³
$\rho_{w,h}$	= 1 000 kg/m ³

 = User defined variables

Length Scale	
N_L	= 13.8

N_{p3}	=	1
$N_{(p2/(pw-1))}$	=	0.9604
N_{p2}	=	2 967

Rock material mix schedule	
Material	Ratio
12 - 16mm	1
16 - 19mm	1
19 - 25mm	1
25 - 28mm	1
28 - 32mm	1
32 - 35mm	1
35 - 36mm	1
36 - 40mm	1



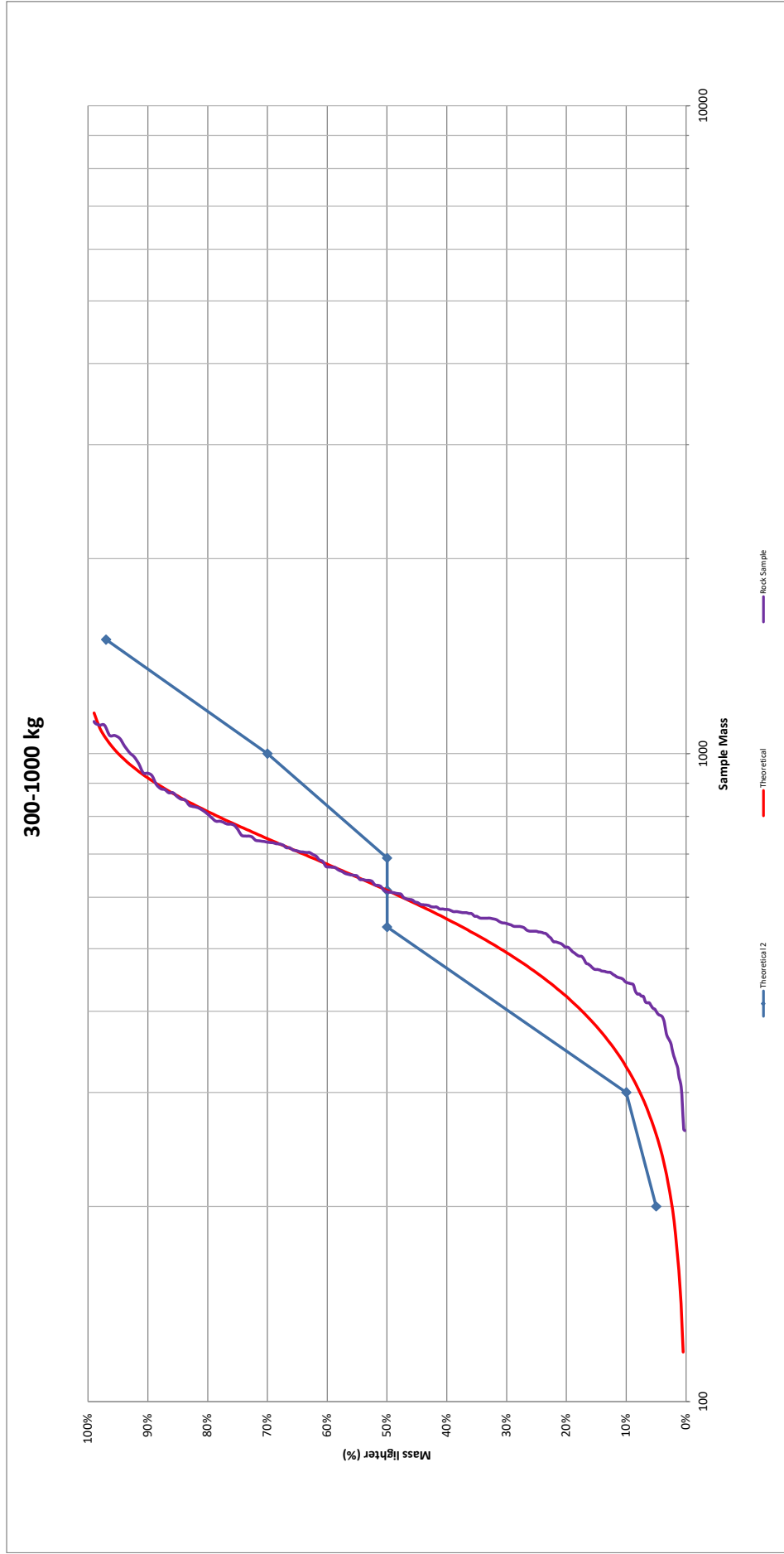
3D Physical Modelling Study Lubec breakwater - USA	
Sample Properties (Prototype)	
Number of Samples:	210
Total Sample Weight:	127 421.4 kg
Minimum Weight:	- kg
Maximum Weight:	1 272.6 kg
Average Weight:	381.5 kg
Median Weight:	461.1 kg
M_{50} :	611.9 kg

Item	% Passing	300-1000 kg
EUL	97%	1500
NUL	70%	1000
$W_{em}(Up)$	50%	690
M_{50}	50%	615
$W_{em}(Low)$	50%	540
NLL	10%	300
ELL	5%	200
Γ_{RRM}		3.00

Material Densities	
$\rho_{a,b}$	= 2 600 kg/m ³
$\rho_{a,m}$	= 2 600 kg/m ³
$\rho_{w,b}$	= 1 025 kg/m ³
$\rho_{w,m}$	= 1 000 kg/m ³

	= User defined variables
Length Scale	
N_L	= 1: 20
N_{p3}	= 1
$N_{(p2/pw-1)}$	= 0.9604
N_{p2}	= 9.032

Rock material mix schedule	
Material	Ratio
12 - 19mm	
19 - 25mm	
25 - 28mm	
28 - 32mm	
32 - 35mm	
35 - 36mm	1
36 - 40mm	1
40 - 60mm	
60 - 80mm	



3D Physical Modelling Study Lubec breakwater - USA	
Sample Properties (Prototype)	254
Number of Samples:	459 176.3 kg
Total Sample Weight:	- kg
Minimum Weight:	4 054.4 kg
Average Weight:	1 374.8 kg
Median Weight:	1 322.0 kg
M_{50} :	1 991.1 kg

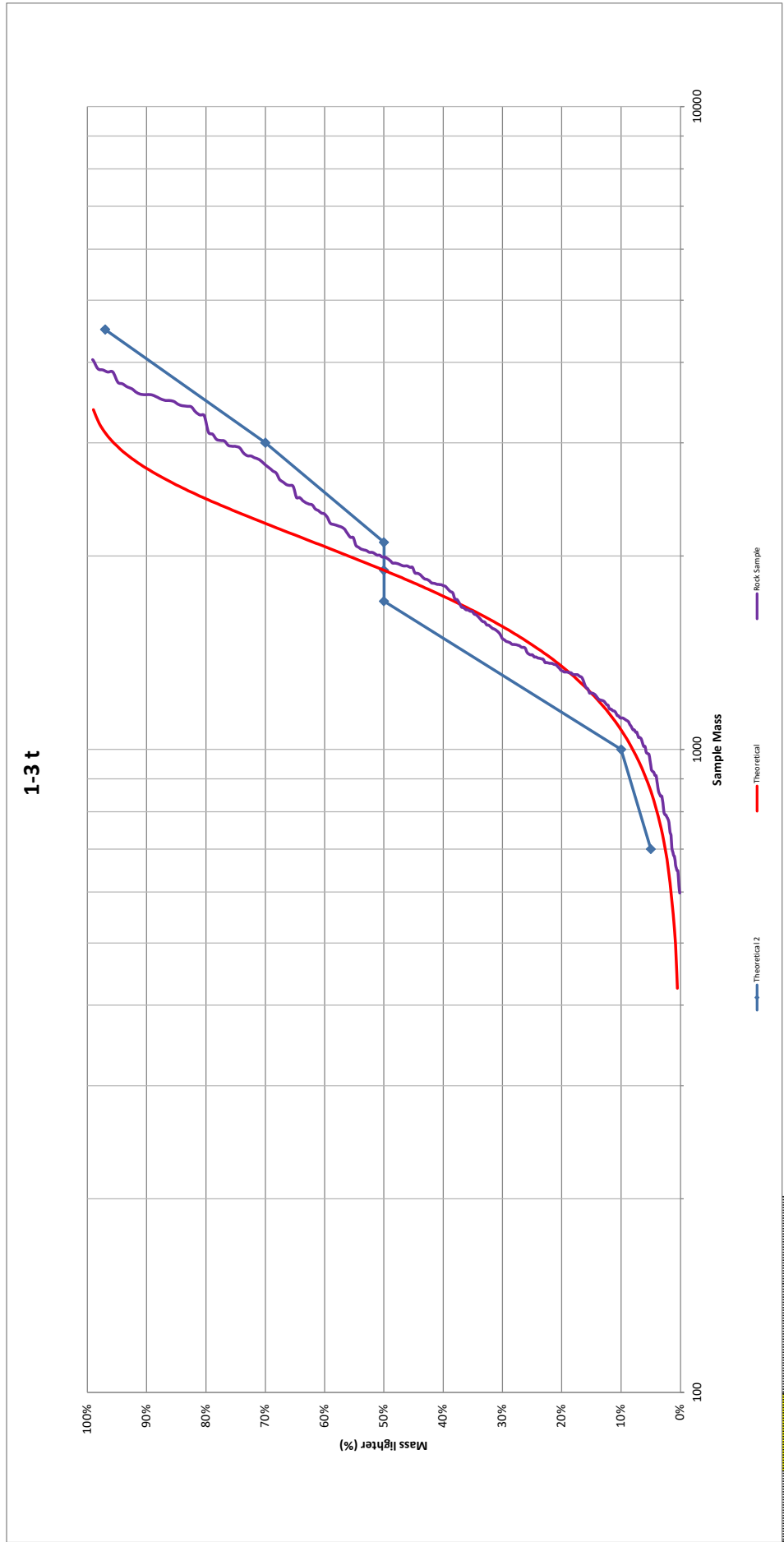
Item	% Passing	1-3 t
EUL	97%	4500
NUL	70%	3000
$W_{em}(Up)$	50%	2100
M_{50}	50%	1900
$W_{em}(Low)$	50%	1700
NLL	10%	1000
ELL	5%	700
Γ_{RRM}		3.29

Material Densities	
$\rho_{a,b}$	= 2 600 kg/m ³
$\rho_{a,h}$	= 2 600 kg/m ³
$\rho_{w,b}$	= 1 025 kg/m ³
$\rho_{w,h}$	= 1 000 kg/m ³

= User defined variables

Length Scale	
N_L	= 1: 20
N_{p3}	= 1
$N_{(p2/pw-1)}$	= 0.9604
N_{p2}	= 9.032

Rock material mix schedule	
Material	Ratio
12 - 19mm	
19 - 25mm	
25 - 28mm	
28 - 32mm	
32 - 35mm	
35 - 36mm	
36 - 40mm	3
40 - 60mm	
60 - 80mm	1



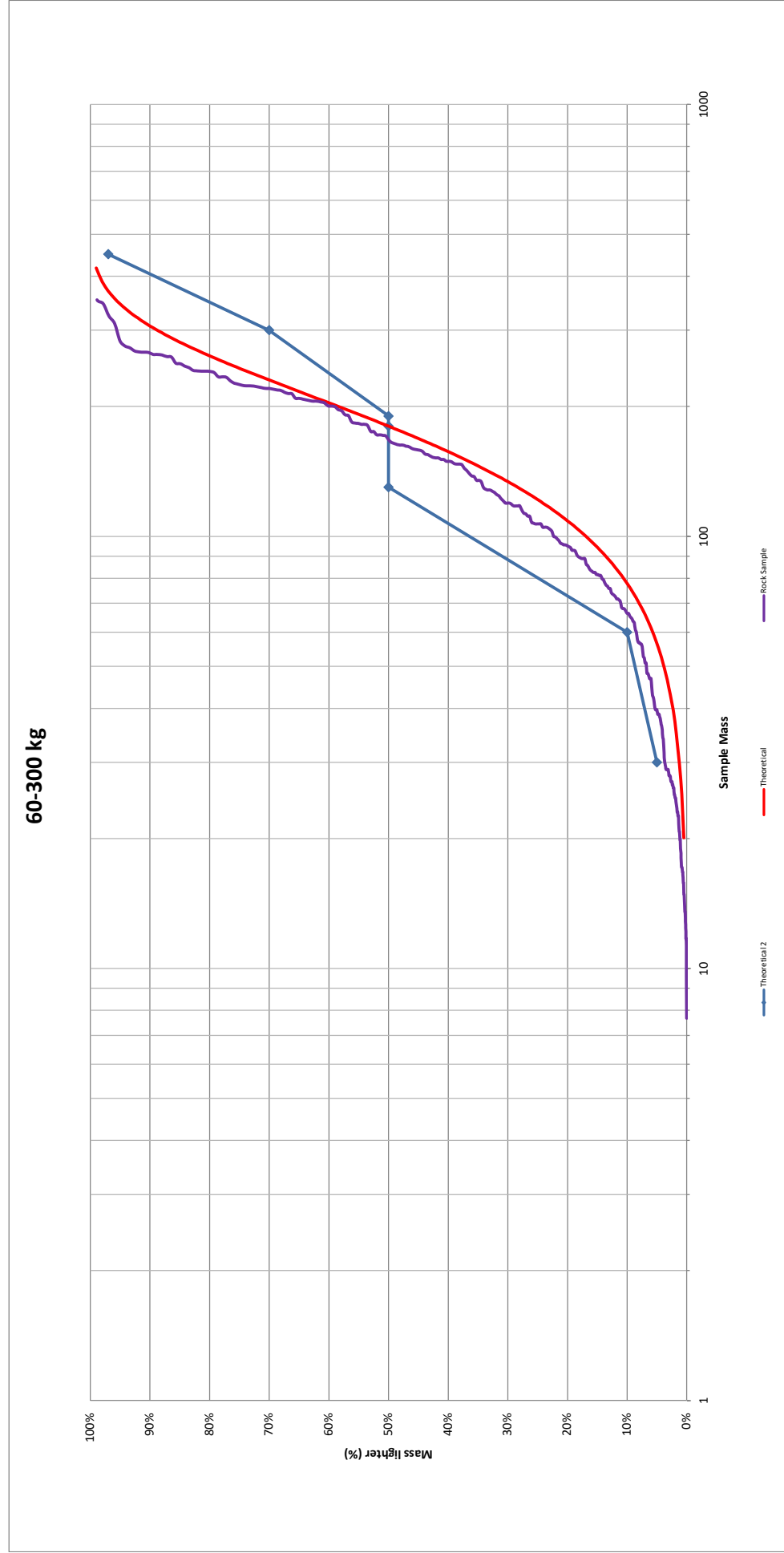
3D Physical Modelling Study Lubec breakwater - USA	
Sample Properties (Prototype)	
Number of Samples:	301
Total Sample Weight:	34 368.8 kg
Minimum Weight:	- kg
Maximum Weight:	387.4 kg
Average Weight:	102.9 kg
Median Weight:	85.9 kg
M_{50} :	167.3 kg

Item	% Passing	60-300 kg
EUL	97%	450
NUL	70%	300
$W_{em}(Up)$	50%	190
M_{50}	50%	180
$W_{em}(Low)$	50%	130
NLL	10%	60
ELL	5%	30
\bar{n}_{RRM}		2.25

Material Densities	
$[\rho_{al,p}]$	= 2 650 kg/m ³
$[\rho_{al,m}]$	= 2 650 kg/m ³
$[\rho_{w,p}]$	= 1 025 kg/m ³
$[\rho_{w,m}]$	= 1 000 kg/m ³

	= User defined variables
Length Scale	
N_L	= 1:20
N_{pa}	= 1
$N_{(pa)/(pvc-1)}$	= 0.9608
$N_{w,g}$	= 9.019

Rock material mix schedule	
Material	Ratio
12 - 16mm	
16 - 19mm	1
12 - 19mm	1
19 - 25mm	
25 - 28mm	2
28 - 32mm	
32 - 35mm	
35 - 36mm	
36 - 40mm	



3D Physical Modelling Study Lubec breakwater - USA	
Sample Properties (Prototype)	
Number of Samples:	512
Total Sample Weight:	575 873.5 kg
Minimum Weight:	377.9 kg
Maximum Weight:	1 154.4 kg
Average Weight:	776.0 kg
Median Weight:	754.0 kg
M_{50} :	1 238.7 kg

Item	% Passing	600-1900 t
EUL	97%	2850
NUL	70%	1900
$W_{em}(Up)$	50%	1280
M_{50}	50%	1250
$W_{em}(Low)$	50%	1040
NLL	10%	600
ELL	5%	350
\bar{n}_{RRM}		3.14

Material Densities	
$[\rho_{al,p}]$	= 2 650 kg/m ³
$[\rho_{al,m}]$	= 2 650 kg/m ³
$[\rho_{w,b}]$	= 1 025 kg/m ³
$[\rho_{w,m}]$	= 1 000 kg/m ³

 = User defined variables

Length Scale	
N_L	= 1:20
N_{pa}	= 1
$N_{(pa)/(pvc-1)}$	= 0.9608
$N_{w,g}$	= 9 019

Rock material mix schedule	
Material	Ratio
12 - 19mm	
19 - 25mm	
25 - 28mm	
28 - 32mm	
32 - 35mm	
35 - 36mm	
40 - 60mm	1
60 - 80mm	1

