

Table S1. Tier 1 indicators and reference points for capture fisheries activities in the extended EBFA (employed from the previous EBFA[9,10]).

Management Objective	Driving force	Indicator	Reference points (Tier 1)		
			Better than target	Between target and Limit	Beyond limit
			0~1	1<RS<2	2~3
• Sustainability	• Capture fisheries	• Biomass(B) • or CPUE	$B_{MSY} \leq B$ $CPUE_{MSY} \leq CPUE$	$1/2(B_{MSY}) \leq B < B_{MSY}$ $1/2(CPUE_{MSY}) \leq CPUE < CPUE_{MSY}$	$B < 1/2(B_{MSY})$ $CPUE < 1/2(CPUE_{MSY})$
		• Catch • or Fishing Mortality(F)	$C \leq MSY$ $F \leq F_{MSY}$	$MSY < C \leq 2MSY$ $F_{MSY} < F \leq 2F_{MSY}$	$2MSY < C$ $2F_{MSY} < F$
		• Age(or length) at first capture(t or L)	$(t_{target} \leq t)$ or $(L_{target} \leq L)$	$(0.9t_{target} \leq t < t_{target})$ or $(0.9L_{target} \leq L < L_{target})$	$(t < 0.9t_{target})$ or $(L < 0.9L_{target})$
		• Rate of mature fish(MR)	$MR_{40\%} \leq MR$	$MR_{20\%} \leq MR < MR_{40\%}$	$MR < MR_{20\%}$
		• Ratio of(released stock abundance) /(wild stock abundance) in catch($R_{r/w}$)	$R_{r/w} \leq 0.5$	$0.5 < R_{r/w} \leq 1.0$	$1.0 < R_{r/w}$
• Habitat quality		• Critical habitat damage rate(DH/H)	$(DH/H) \leq (DH/H)_{target}$	$(DH/H)_{target} < (DH/H) \leq (DH/H)_{limit}$	$(DH/H) > (DH/H)_{limit}$
		• Lost fishing gear(Frequency, FR)	$FR \leq FR_{target}$	$FR_{target} < FR \leq FR_{limit}$	$FR > FR_{limit}$
		• Discard wastes rate(DW)	$DW \leq DW_{target}$	$DW_{target} < DW \leq DW_{limit}$	$DW > DW_{limit}$
		• Pollution rate of spawning and nursery ground(PG/G)	$(PG/G) \leq (PG/G)_{target}$	$(PG/G)_{target} < (PG/G) \leq (PG/G)_{limit}$	$(PG/G) > (PG/G)_{limit}$
• Biodiversity		• Bycatch rate(BC/C)	$(BC/C) \leq (BC/C)_{target}$	$(BC/C)_{target} < (BC/C) \leq (BC/C)_{limit}$	$(BC/C) > (BC/C)_{limit}$
		• Discard rate(D/C)	$(D/C) \leq (D/C)_{target}$	$(D/C)_{target} < (D/C) \leq (D/C)_{limit}$	$(D/C) > (D/C)_{limit}$
		• Diversity index(DI)	$(DI) \geq DI_{target}$	$DI_{target} > (DI) \geq DI_{limit}$	$(DI) < DI_{limit}$
• Socio-economic benefits		• Income per person employed(IPPE)	$IPPE \geq UIPPE$	$LIPPE \leq IPPE < UIPPE$	$IPPE < LIPPE$
		• Ratio of profit to sales(RPS)	$RPS \geq URPS$	$0\% \leq RPS < URPS$	$RPS < 0\%$
		• Employment rate(ER)	$ER \geq UER$	$0.5UER \leq ER < UER$	$ER < 0.5UER$

Table S2. Tier 1 indicators and reference points for other driving forces in the extended EBFA.

Management Objective	Driving force	Indicator	Reference points (Tier 1)		
			Better than target	Between target and Limit	Beyond limit
			0~1	1<RS<2	2~3
• Sustainability	• Aquaculture	• Cultured / wild biomass ratio ($R_{c/w}$)	$R_{c/w} \leq R_{c/w \text{ target}}$	$R_{c/w \text{ target}} < R_{c/w} \leq R_{c/w \text{ limit}}$	$R_{c/w \text{ limit}} < R_{c/w}$
	• Leisure activities	• Catch by leisure (C_L)	$C_L \leq C_L \text{ target}$	$C_L \text{ target} < C_L \leq C_L \text{ limit}$	$C_L \text{ limit} < C_L$
		• Catch by tideland education (C_T)	$C_T \leq C_T \text{ target}$	$C_T \text{ target} < C_T \leq C_T \text{ limit}$	$C_T \text{ limit} < C_T$
	• Accident and disaster	• Predation by jellyfish (P_J)	$P_J \leq P_J \text{ target}$	$P_J \text{ target} < P_J \leq P_J \text{ limit}$	$P_J \text{ limit} < P_J$
		• Predation by starfish (P_S)	$P_S \leq P_S \text{ target}$	$P_S \text{ target} < P_S \leq P_S \text{ limit}$	$P_S \text{ limit} < P_S$
		• Deaths by eutrophication (DA)	$AD \leq AD_{\text{target}}$	$AD_{\text{target}} < AD \leq AD_{\text{limit}}$	$AD_{\text{limit}} < AD$
		• Deaths by oil pollution (DO)	$AD \leq AD_{\text{target}}$	$AD_{\text{target}} < AD \leq AD_{\text{limit}}$	$AD_{\text{limit}} < AD$
	• Stock enhancement activities	• Biomass enhancement by fries or juveniles release (BE)	$BE \geq BE_{\text{target}}$	$BE_{\text{limit}} \leq BE < BE_{\text{target}}$	$BE < BE_{\text{limit}}$
• Habitat quality	• Aquaculture	• Fish waste (W_F)	$W_F \leq W_F \text{ target}$	$W_F \text{ target} < W_F \leq W_F \text{ limit}$	$W_F \text{ limit} < W_F$
		• Aquaculture debris (AD)	$AD \leq AD_{\text{target}}$	$AD_{\text{target}} < AD \leq AD_{\text{limit}}$	$AD_{\text{limit}} < AD$
		• Fish food waste (FW)	$FW \leq FW_{\text{target}}$	$FW_{\text{target}} < FW \leq FW_{\text{limit}}$	$FW_{\text{limit}} < FW$
		• Water circulation (WC)	$WC \leq WC_{\text{target}}$	$WC_{\text{target}} < WC \leq WC_{\text{limit}}$	$WC_{\text{limit}} < WC$
	• Land-based pollution	• Domestic sewage (DS)	$DS \leq DS_{\text{target}}$	$DS_{\text{target}} < DS \leq DS_{\text{limit}}$	$DS_{\text{limit}} < DS$
		• Domestic excreta (DE)	$DE \leq DE_{\text{target}}$	$DE_{\text{target}} < DE \leq DE_{\text{limit}}$	$DE_{\text{limit}} < DE$
		• Industrial sewage (IS)	$IS \leq IS_{\text{target}}$	$IS_{\text{target}} < IS \leq IS_{\text{limit}}$	$IS_{\text{limit}} < IS$
		• Industrial organic matter (IO)	$IO \leq IO_{\text{target}}$	$IO_{\text{target}} < IO \leq IO_{\text{limit}}$	$IO_{\text{limit}} < IO$
		• Industrial heated effluent (IH)	$IH \leq IH_{\text{target}}$	$IH_{\text{target}} < IH \leq IH_{\text{limit}}$	$IH_{\text{limit}} < IH$
	• Construction activities	• Waste by construction (W_C)	$W_C \leq W_C \text{ target}$	$W_C \text{ target} < W_C \leq W_C \text{ limit}$	$W_C \text{ limit} < W_C$
		• Seabed-sand collection (SC)	$SC \leq SC_{\text{target}}$	$SC_{\text{target}} < SC \leq SC_{\text{limit}}$	$SC_{\text{limit}} < SC$
		• Shoreline change by reclamation (SC_r)	$SC_r \leq SC_r \text{ target}$	$SC_r \text{ target} < SC_r \leq SC_r \text{ limit}$	$SC_r \text{ limit} < SC_r$
		• Sediment inflow by reclamation (SI)	$SI \leq SI_{\text{target}}$	$SI_{\text{target}} < SI \leq SI_{\text{limit}}$	$SI_{\text{limit}} < SI$
	• Leisure activities	• Waste by leisure activities (W_L)	$W_L \leq W_L \text{ target}$	$W_L \text{ target} < W_L \leq W_L \text{ limit}$	$W_L \text{ limit} < W_L$

		• Heavy metal waste by leisure activities (HM)	$HM \leq HM_{\text{target}}$	$HM_{\text{target}} < HM \leq HM_{\text{limit}}$	$HM_{\text{limit}} < HM$
		• Habitat physical damage by leisure activities (HD _L)	$HD_L \leq HD_{L \text{ target}}$	$HD_{L \text{ target}} < HD_L \leq HD_{L \text{ limit}}$	$HD_{L \text{ limit}} < HD_L$
		• Tideland habitat physical damage by tideland education (HD _T)	$HD_T \leq HD_{T \text{ target}}$	$HD_{T \text{ target}} < HD_T \leq HD_{T \text{ limit}}$	$HD_{T \text{ limit}} < HD_T$
	• Accident and disaster	• Global warming by climate change (GW)	$GW \leq GW_{\text{target}}$	$GW_{\text{target}} < GW \leq GW_{\text{limit}}$	$GW_{\text{limit}} < GW$
		• Ocean acidification by climate change (OA)	$RT \leq RT_{\text{target}}$	$RT_{\text{target}} < RT \leq RT_{\text{limit}}$	$RT_{\text{limit}} < RT$
		• Eutrophication(red tide occurrence) (RT)	$RT \leq RT_{\text{target}}$	$RT_{\text{target}} < RT \leq RT_{\text{limit}}$	$RT_{\text{limit}} < RT$
		• Whitening event (WE)	$WE \leq WE_{\text{target}}$	$WE_{\text{target}} < WE \leq WE_{\text{limit}}$	$WE_{\text{limit}} < WE$
		• Water runoff by storm (WR)	$WR \leq WR_{\text{target}}$	$WR_{\text{target}} < WR \leq WR_{\text{limit}}$	$WR_{\text{limit}} < WR$
		• Oil pollution by ship accident (OP)	$OP \leq OP_{\text{target}}$	$OP_{\text{target}} < OP \leq OP_{\text{limit}}$	$OP_{\text{limit}} < OP$
		• Oxygen deficient event (OD)	$OD \leq OD_{\text{target}}$	$OD_{\text{target}} < OD \leq OD_{\text{limit}}$	$OD_{\text{limit}} < OD$
		• Typhoon event (TE)	$TE \leq TE_{\text{target}}$	$TE_{\text{target}} < TE \leq TE_{\text{limit}}$	$TE_{\text{limit}} < TE$
	• Stock enhancement activities	• Artificial reefs deployment (AR)	$AR \geq AR_{\text{target}}$	$AR_{\text{limit}} \leq AR < AR_{\text{target}}$	$AR < AR_{\text{limit}}$
• Biodiversity	• Aquaculture	• Attracted wild fish by uneaten food (AF)	$AF \leq AF_{\text{target}}$	$AF_{\text{target}} < AF \leq AF_{\text{limit}}$	$AF_{\text{limit}} < AF$
		• Escaped cultured species (E _c)	$E_c \leq E_{c \text{ target}}$	$E_{c \text{ target}} < E_c \leq E_{c \text{ limit}}$	$E_{c \text{ limit}} < E_c$
		• Disease spread to wild fish (DS)	$DS \leq DS_{\text{target}}$	$DS_{\text{target}} < DS \leq DS_{\text{limit}}$	$DS_{\text{limit}} < DS$
	• Land-based pollution	• Ballast water discharge (BD)	$BD \leq BD_{\text{target}}$	$BD_{\text{target}} < BD \leq BD_{\text{limit}}$	$BD_{\text{limit}} < JB$
	• Accident and disaster	• Jellyfish bloom (JB)	$JB \leq JB_{\text{target}}$	$JB_{\text{target}} < JB \leq JB_{\text{limit}}$	$JB_{\text{limit}} < JB$
		• Starfish bloom (SB)	$SB \leq SB_{\text{target}}$	$SB_{\text{target}} < SB \leq SB_{\text{limit}}$	$SB_{\text{limit}} < SB$
• Socio-economic benefits	• Leisure activities	• Extra income from supporting leisure activities (EI _L)	$EI_L \geq EI_{L \text{ target}}$	$EI_{L \text{ limit}} \leq EI_L < EI_{L \text{ target}}$	$EI_L < EI_{L \text{ limit}}$
		• Extra employment by leisure activities (EE _L)	$EE_L \geq EE_{L \text{ target}}$	$EE_{L \text{ limit}} \leq EE_L < EE_{L \text{ target}}$	$EE_L < EE_{L \text{ limit}}$
	• Accidents and disasters	• Fishing gear damage or ship damage by accident or disaster (FD)	$FD \leq FD_{\text{target}}$	$FD_{\text{target}} < FD \leq FD_{\text{limit}}$	$FD_{\text{limit}} < FD$

Table S3. Tier 2 indicators and reference points for capture fisheries activities in the extended EBFA (employed from the previous EBFA[9,10]).

Management Objective	Driving force	Indicator	Reference points (Tier 2)						
			Better than target		Between target and limit			Beyond limit	
			0	0.5	1.0	1.5	2.0	2.5	3.0
• Sustainability	• Capture fisheries	<ul style="list-style-type: none"> • Biomass(B) • or CPUE 	<p>More than x years of CPUE data are available</p> <p>Current CPUE are extremely large compared with average of CPUE during X years</p>	<p>More than x years of CPUE data are available</p> <p>Current CPUE are large compared with average of CPUE during X years</p>	<p>More than X years of CPUE data are available</p> <p>Current CPUE are moderately large compare with average of CPUE during X years</p> <p>or</p> <p>Less than X years of CPUE data are available</p> <p>Current CPUE are moderately large compared with average of CPUE during X years</p>	<p>Less than X years of CPUE data are available</p> <p>CPUE is unchanged</p> <p>or</p> <p>Less than X years of CPUE data are available</p> <p>Current CPUE is similar to average of CPUE during X years</p>	<p>Less than X years of CPUE data are available</p> <p>Current CPUE is moderately small compared with average of CPUE during X years</p>	<p>CPUE data are not available, catch trend is unchanged</p> <p>or</p> <p>CPUE data are available, Current CPUE are small compared with average of CPUE during X years</p>	<p>CPUE data are not available, catch trend is declining</p> <p>or,</p> <p>CPUE data are available, Current CPUE are extremely small compared with average of CPUE during X years</p>
		<ul style="list-style-type: none"> • Catch or Fishing Mortality(F) 	<p>Effort is extremely small compared with average of effort during X years</p> <p>fisheries management and active self-regulation exist</p>	<p>Effort is small compared with average of effort during X years</p> <p>fisheries management or self-regulation exist</p>	<p>Effort is moderately small compared with average of effort during X years</p> <p>fisheries management or self-regulation exist partly</p>	<p>Effort is similar to average of effort during X years</p>	<p>Effort is moderately large compared with average of effort during X years</p>	<p>Number of license or fishing gear is unchanged</p> <p>or</p> <p>Effort is in an increasing state</p> <p>or</p> <p>IUU fisheries exist partly</p>	<p>Number of license or fishing gear is excessive</p> <p>or</p> <p>Effort is rapidly increasing</p> <p>or</p> <p>IUU fisheries exist largely</p>

		<ul style="list-style-type: none"> • Age(or length) at first capture(t or L) 	Length at first capture is extremely large compared with mature length	Length at first capture is large compared with mature length or Average length of catch is extremely large compared with mature length	Length at first capture is moderately large compared with mature length or Average length of catch is large compared with mature length or Institutional prohibition length is established and managed	Length at first capture is similar to mature length or Average length of catch is moderately large compared with mature length or Self-regulated prohibition length is established and managed	Length at first capture is moderately small compared with mature length or Average length of catch is similar to mature length or Prohibition length is establish but length at first capture is smaller than prohibition length	Length at first capture is small compared with mature length or Average length of catch is moderately small compared with mature length or Length at first capture is not available, prohibition length is not establish
		<ul style="list-style-type: none"> • Rate of mature fish(MR) 	Fishing never occurs during the spawning season or Prohibition season(prohibition fishing ground) is set up and conduct to conserve mature fish	No more than a minor amount of the catch is taken during the spawning season	No more than a moderate amount of the catch is allowed to be harvested during the spawning season	No more than a moderate to a considerable amount of fish is allowed to be taken during the spawning season	A significant amount of catch is allowed to be taken during the spawning season	A significant to most of the fisheries place during the spawning season
		<ul style="list-style-type: none"> • Ratio of(released stock abundance) /(wild stock abundance) 	Never release fish in the area (There is no entrance from external area)	A few release fish in the area	Release conducted once and small amount in recent X year (X = generation	Release conducted twice in recent X year (X = generation period – age at	Release conducted three times and considerable amount in recent X year	Release conducted more than four times and considerable amount in

		in catch($R_{r/w}$)			period – age at release) on the area	release) on the area	(X = generation period – age at release) on the area	recent X year (X = generation period – age at release) on the area	
• Habitats quality	• Capture fisheries	• Critical habitat damage rate(DH/H)	Fishing gear that has extremely small impact on the habitat (Purse seine, Midwater trawl etc.) or Fishing gear that has small impact on the habitat (Surface gillnet, anchovy tow net, boat seine, jigging, pole and line, lift net etc.) Operating period of fishing gear is short	Fishing gear that has small impact on the habitat (Surface gillnet, anchovy tow net, boat seine, jigging, pole and line, lift net etc.) Operating period of fishing gear is very long or Fishing gear that has moderately small impact on the habitat (Stow net, swing net on stakes, long bag set net, setnet etc.) Operating period of fishing gear is long	Fishing gear that has moderately small impact on the habitat (Stow net, swing net on stakes, long bag set net, setnet etc.) Operating period of fishing gear is very long or Fishing gear that has average impact on the habitat (bottom longline, bottom drift gill net etc.) Operating period of fishing gear is long	Fishing gear that has average impact on the habitat (bottom longline, bottom drift gill net) Operating period of fishing gear is very long or Fishing gear that has moderately large impact on the habitat (Trap, bottom gill net etc.) Operating period of fishing gear is long	Fishing gear that has moderately large impact on the habitat (Trap, bottom gill net etc.) Operating period of fishing gear is very long or Fishing gear that has large impact on the habitat (Beam- trawl, Danish seine, haul net etc.) Operating period of fishing gear is long	Fishing gear that has large impact on the habitat (Beam- trawl, Danish seine, haul net etc.) Operating period of fishing gear is very long or Fishing gear that has extremely large impact on the habitat (Bottom trawl, dredge, spray fishing gear etc.) Operating period of fishing gear is long	Fishing gear that has extremely large impact on the habitat (Bottom trawl, dredge, spray fishing gear etc.) Operating period of fishing gear is very long
		• Lost fishing gear(Freque ncy, FR)	Possibility for potential loss of fishing gear is high degree of uncertainty	Possibility for potential loss of fishing gear is highly unlikely	Possibility for potential loss of fishing gear is unlikely Setting period of fishing gear	Possibility for potential loss of fishing gear is ambiguous	Possibility for potential loss of fishing gear is likely Setting period of fishing gear	Possibility for potential loss of fishing gear is highly likely	Possibility for potential loss of fishing gear is high degree of certainty

			Setting period of fishing gear is extremely short	Setting period of fishing gear is short	is moderately short	Setting period of fishing gear is average	is moderately long	Setting period of fishing gear is long	Setting period of fishing gear is extremely long Discarded waste is extremely large or Fatal fishing wastes is being discarded
		• Discard wastes rate(DW)	Discarded waste is extremely small	Discarded waste is small	Discarded waste is moderately small	Discarded waste is average	Discarded waste is moderately large	Discarded waste is large	Discarded waste is extremely large or Fatal fishing wastes is being discarded
		• Pollution rate of spawning and nursery ground(PG/G)	There is information on the magnitude of pollution by the target fisheries on the spawning and nursery grounds, no pollution by the target fisheries on the spawning and nursery grounds no oil spillage accident	There is information on the magnitude of pollution by the target fisheries on the spawning and nursery ground and a few pollution by the target fisheries on the spawning and nursery grounds	There is information on the magnitude of pollution by the target fisheries on the spawning and nursery ground and some pollution by the target fisheries on the spawning and nursery grounds	There is information on the magnitude of pollution by the target fisheries on the spawning and nursery ground and considerable pollution by the target fisheries on the spawning and nursery grounds	There is information on the magnitude of pollution by the target fisheries on the spawning and nursery ground and much pollution by the target fisheries on the spawning and nursery grounds	There is no information on the magnitude of pollution by the target fisheries on the spawning and nursery ground and existence of oil spillage accident within recent 3-5 years	There is no information on the magnitude of pollution by the target fisheries on the spawning and nursery ground and existence of oil spillage accident within recent 3 years
• Biodiversity	• Capture fisheries	• Bycatch rate(BC/C)	Bycatch never occurs compared with average of bycatch rate during X years	Current bycatch rate is extremely small compared with average of	Current bycatch rate is small compared with average of bycatch rate during X years	Current bycatch rate is moderately small compared with average of	Current bycatch rate is similar compared with average of bycatch rate during X years	Current bycatch rate is moderately large compared with average of bycatch rate during X years	Current bycatch rate is large compared with average of bycatch rate during X years

			extremely large	large	moderately large	average	moderately small	small	extremely small
		• Employment rate(ER)	Index of fisheries employment (number of fishermen× number of fishing vessels) for recent X years is extremely large	Index of fisheries employment (number of fishermen× number of fishing vessels) for recent X years is large	Index of fisheries employment (number of fishermen× number of fishing vessels) for recent X years is moderately large	Index of fisheries employment (number of fishermen× number of fishing vessels) for recent X years is average	Index of fisheries employment (number of fishermen× number of fishing vessels) for recent X years is moderately small	Index of fisheries employment (number of fishermen× number of fishing vessels) for recent X years is small	Index of fisheries employment (number of fishermen× number of fishing vessels) for recent X years is extremely small

Table S4. Tier 2 indicators and reference points for other driving forces in the extended EBFA.

Management Objective	Driving force	Indicator	Reference points (Tier 2)						
			Better than target		Between target and limit			Beyond limit	
			0	0.5	1.0	1.5	2.0	2.5	3.0
• Sustainability	• Aquaculture	• Cultured / wild biomass ratio	Cultured biomass is extremely smaller than wild biomass	Cultured biomass is smaller than wild biomass	Cultured biomass is moderately smaller than wild biomass	Cultured biomass is average	Cultured biomass is significant	Cultured biomass is highly significant	Cultured biomass is the same as wild biomass
	• Leisure activities	• Catch by leisure	Catch by leisure is extremely small	Catch by leisure is small	Catch by leisure is moderately small	Catch by leisure is average	Catch by leisure is moderately large	Catch by leisure is large	Catch by leisure is extremely large
		• Catch by tideland education	Catch by tideland education is extremely small	Catch by tideland education is small	Catch by tideland education is moderately small	Catch by tideland education is average	Catch by tideland education is moderately large	Catch by tideland education is large	Catch by tideland education is extremely large
	• Accident and disaster	• Predation by jellyfish	Predation by jellyfish is extremely small	Predation by jellyfish is negligible	Predation by jellyfish is minor	Predation by jellyfish is moderate	Predation by jellyfish is significant	Predation by jellyfish is highly significant	Predation by jellyfish is extremely large
		• Predation by starfish	Predation by starfish is extremely small	Predation by starfish is negligible	Predation by starfish is minor	Predation by starfish is moderate	Predation by starfish is significant	Predation by starfish is highly significant	Predation by starfish is extremely large
		• Deaths by eutrophication	Deaths by eutrophication never occurs	Deaths by eutrophication rarely occurs	Deaths by eutrophication sometimes occurs	Deaths by eutrophication averagely occurs	Deaths by eutrophication often occurs	Deaths by eutrophication frequently occurs	Deaths by eutrophication always occurs

		• Deaths by oil pollution	Death by oil pollution is does not exist	Death by oil pollution is negligible	Death by oil pollution is minor	Death by oil pollution is moderate	Death by oil pollution is significant	Death by oil pollution is highly significant	Death by oil pollution is catastrophic
	• Stock enhancement activities	• Biomass enhancement by fries or juveniles release	Never release fries or juveniles in the area	A few release fries or juveniles in the area	Release conducted once and small amount in recent X year (X = generation period – age at release) on the area	Release conducted twice in recent X year (X = generation period – age at release) on the area	Release conducted three times and considerable amount in recent X year (X = generation period – age at release) on the area	Release conducted more than four times and considerable amount in recent X year (X = generation period – age at release) on the area	Release conducted continuously and considerable amount in the most recent past
• Habitat quality	• Aquaculture	• Fish waste	Amount of fish waste is extremely small	Amount of fish waste is small	Amount of fish waste is moderately small	Amount of fish waste is average	Amount of fish waste is moderately large	Amount of fish waste is large	Amount of fish waste is extremely large
		• Aquaculture debris	Aquaculture debris is extremely small	Aquaculture debris is small	Aquaculture debris is moderately small	Aquaculture debris is considerable	Aquaculture debris is moderately large	Aquaculture debris is large	Aquaculture debris is extremely large
		• Fish food waste	Amount of fish food waste is extremely smaller than total fish food	Amount of fish food waste is smaller than total fish food	Amount of fish food waste is moderately smaller than total fish food	Amount of fish food waste is average	Amount of fish food waste is significant	Amount of fish food waste is highly significant	Amount of fish food waste is the same as total fish food
		• Water circulation	Water circulation is always occurs	Water circulation is frequently occurs	Water circulation is often occurs	Water circulation is averagely occurs	Water circulation is sometimes occurs	Water circulation is rarely occurs	Water circulation is never occurs

	• Land-based pollution	• Domestic sewage	Amount of domestic sewage is extremely small	Amount of domestic sewage is small	Amount of domestic sewage is moderately small	Amount of domestic sewage is average	Amount of domestic sewage is moderately large	Amount of domestic sewage is large	Amount of domestic sewage is extremely large
		• Domestic excreta	Amount of domestic excreta is extremely small	Amount of domestic excreta is small	Amount of domestic excreta is moderately small	Amount of domestic excreta is average	Amount of domestic excreta is moderately large	Amount of domestic excreta is large	Amount of domestic excreta is extremely large
		• Industrial sewage	Amount of industrial sewage is extremely small	Amount of industrial sewage is small	Amount of industrial sewage is moderately small	Amount of industrial sewage is average	Amount of industrial sewage is moderately large	Amount of industrial sewage is large	Amount of industrial sewage is extremely large
		• Industrial organic matter	Amount of industrial organic is extremely small	Amount of industrial organic is small	Amount of industrial organic is moderately small	Amount of industrial organic is average	Amount of industrial organic is moderately large	Amount of industrial organic is large	Amount of industrial organic is extremely large
		• Industrial heated effluent	Heated effluent temperature is the same as water temperature	Heated effluent temperature is higher than 0.5° compared with water temperature	Heated effluent temperature is higher than 1° compared with water temperature	Heated effluent temperature is higher than 2° compared with water temperature	Heated effluent temperature is higher than 4° compared with water temperature	Heated effluent temperature is higher than 6° compared with water temperature	Heated effluent temperature is higher than 8° compared with water temperature
	• Construction activities	• Waste by construction	Amount of waste by construction is extremely small	Amount of waste by construction is small	Amount of waste by construction is moderately small	Amount of waste by construction is average	Amount of waste by construction is moderately large	Amount of waste by construction is large	Amount of waste by construction is extremely large
		• Seabed-sand collection	Seabed-sand collection activities are never occur	Seabed-sand collection activities are rarely occur	Seabed-sand collection activities are sometimes occur	Seabed-sand collection activities are averagely occur	Seabed-sand collection activities are often occur	Seabed-sand collection activities are frequently occur	Seabed-sand collection activities are always occur

		• Shoreline change by reclamation	Rate of shoreline change by reclamation is extremely low	Rate of shoreline change by reclamation is low	Rate of shoreline change by reclamation is moderately low	Rate of shoreline change by reclamation is average	Rate of shoreline change by reclamation is moderately high	Rate of shoreline change by reclamation is high	Rate of shoreline change by reclamation is extremely high
		• Sediment inflow by reclamation	Sediment inflow by reclamation is extremely small	Sediment inflow by reclamation is small	Sediment inflow by reclamation is moderately small	Sediment inflow by reclamation is average	Sediment inflow by reclamation is moderately large	Sediment inflow by reclamation is large	Sediment inflow by reclamation is extremely large
	• Leisure activities	• Waste by leisure activities	Amount of waste by leisure activities is extremely small	Amount of waste by leisure activities is small	Amount of waste by leisure activities is moderately small	Amount of waste by leisure activities is average	Amount of waste by leisure activities is moderately large	Amount of waste by leisure activities is large	Amount of waste by leisure activities is extremely large
		• Heavy metal waste by leisure activities	No heavy metal waste by leisure activities	Amount of heavy metal waste by leisure activities is extremely small	Amount of heavy metal waste by leisure activities is small	Amount of heavy metal waste by leisure activities is moderately small	Amount of heavy metal waste by leisure activities is average	Amount of heavy metal waste by leisure activities is moderately large	Amount of heavy metal waste by leisure activities is large
		• Habitat physical damage by leisure activities	Habitat damage is extremely small	Habitat damage is negligible	Habitat damage is minor	Habitat damage is moderate	Habitat damage is significant	Habitat damage is severe	Damaged habitat condition is worst
		• Tideland habitat damage by tideland education	Tideland habitat damage is extremely small	Tideland habitat damage is negligible	Tideland habitat damage is minor	Tideland habitat damage is moderate	Tideland habitat damage is significant	Tideland habitat damage is severe	Damaged habitat is worst
	• Accident and disaster	• Global warming by climate change	SST difference from the common state is extremely small	SST difference from the common state is small	SST difference from the common state is moderately small	SST difference from the common state is average	SST difference from the common state is moderately large	SST difference from the common state is large	SST difference from the common state is extremely large

		• Ocean acidification by climate change	PH difference from the common state is extremely small	PH difference from the common state is small	PH difference from the common state is moderately small	PH difference from the common state is average	PH difference from the common state is moderately large	PH difference from the common state is large	PH difference from the common state is extremely large
		• Eutrophication (red tide occurrence)	Eutrophication (red tide) never occurs	Eutrophication (red tide) rarely occurs	Eutrophication (red tide) sometimes occurs	Eutrophication (red tide) averagely occurs	Eutrophication (red tide) often occurs	Eutrophication (red tide) frequently occurs	Eutrophication (red tide) always occurs
		• Whitening event	Whitening event never occurs	A rate of whitening event area per unit area is smaller than 5%	A rate of whitening event area per unit area is smaller than 10%	A rate of whitening event area per unit area is smaller than 15%	A rate of whitening event area per unit area is smaller than 20%	A rate of whitening event area per unit area is smaller than 25%	A rate of whitening event area per unit area is smaller than 30%
		• Water runoff by storm	Water runoff by storm is extremely small	Water runoff by storm is small	Water runoff by storm is moderately small	Water runoff by storm is average	Water runoff by storm is moderately large	Water runoff by storm is large	Water runoff by storm is extremely large
		• Oil pollution by ship accident	There is no pollution on fisheries or No oil spillage accident	There is a few pollution on fisheries	There is some pollution on the fisheries	There is considerable pollution on the fisheries	There is much pollution on the fisheries	Existence of oil spillage accident within recent 3-5years	Existence of oil spillage accident within recent 3years
		• Oxygen deficient event	Oxygen deficient event is never occur	Oxygen deficient event rarely occurs	Oxygen deficient event sometimes occurs	Oxygen deficient event averagely occurs	Oxygen deficient event often occurs	Oxygen deficient event frequently occurs	Oxygen deficient event always occurs
		• Typhoon event	Typhoon is frequently occurs and amount of waste inflow from land is extremely small	Typhoon is frequently occurs and amount of waste inflow from land is small	Typhoon is often occurs and amount of waste inflow from land is moderately small	Typhoon is averagely occurs and amount of waste inflow from land is considerable	Typhoon is sometimes occurs and amount of waste inflow from land is moderately large	Typhoon is rarely occurs and amount of waste inflow from land is large	Typhoon is never occurs and amount of waste inflow from land is extremely large

	• Stock enhancement activities	• Artificial reefs deployment	Artificial reefs deployment is never occur	The number of artificial reefs per unit area is extremely small	The number of artificial reefs per unit area is small	The number of artificial reefs per unit area is moderately small	The number of artificial reefs per unit area is average	The number of artificial reefs per unit area is moderately large	The number of artificial reefs per unit area is large
• Biodiversity	• Aquaculture	• Attracted fish amount by uneaten food	Amount of uneaten feed is extremely smaller than total feed	Amount of uneaten feed is smaller than total feed	Amount of uneaten feed is moderately smaller than total feed	Amount of uneaten feed is average	Amount of uneaten feed is significant	Amount of uneaten feed is highly significant	Amount of uneaten feed is the same as total feed
		• Escaped cultured species	Amount of escaped cultured species is extremely smaller than total cultured species (<5%)	Amount of escaped cultured species is smaller than total cultured species (5~10%)	Amount of escaped cultured species is moderately smaller than total cultured species (10~20%)	Amount of escaped cultured species is average (20~30%)	Amount of escaped cultured species is significant (30~40%)	Amount of escaped cultured is highly significant (40~50%)	Amount of escaped cultured species is extremely large (>50%)
		• Death of wild fish due to disease spread	A rate of death of wild fish by disease spread is extremely lower than natural mortality	A rate of death of wild fish by disease spread is lower than natural mortality	A rate of death of wild fish by disease spread is moderately lower than natural mortality	A rate of death of wild fish by disease spread is average compared with natural mortality	A rate of death of wild fish by disease spread is moderately higher than natural mortality	A rate of death of wild fish by disease spread is higher than natural mortality	A rate of death of wild fish by disease spread is extremely higher than natural mortality
	• Land-based pollution	• Ballast water discharge	Amount of discharged ballast water is extremely small	Amount of discharged ballast water is small	Amount of discharged ballast water is moderately small	Amount of discharged ballast water is average	Amount of discharged ballast water is moderately large	Amount of discharged ballast water is large	Amount of discharged ballast water is extremely large
	• Accidents and disasters	• Jellyfish bloom	Jellyfish bloom always occurs	Jellyfish bloom frequently occurs	Jellyfish bloom often occurs	Jellyfish bloom averagely occurs	Jellyfish bloom sometimes occurs	Jellyfish bloom rarely occurs	Jellyfish bloom never occurs
		• Starfish bloom	Starfish bloom always occurs	Starfish bloom frequently occurs	Starfish bloom often occurs	Starfish bloom averagely occurs	Starfish bloom sometimes occurs	Starfish bloom rarely occurs	Starfish bloom never occurs

• Socio-economic benefits	• Leisure activities	• Extra income from supporting leisure activities	Extra income is extremely larger than minimum living cost	Extra income is larger than minimum living cost	Extra income is moderately larger than minimum living cost	Extra income is average compared with minimum living cost	Extra income is moderately smaller than minimum living cost	Extra income is smaller than minimum living cost	Extra income is extremely smaller than minimum living cost
		• Extra employment rate by leisure activities	Extra employment rate by leisure activities is extremely high compared with capture fisheries employment rate	Extra employment rate by leisure activities is high compared with capture fisheries employment rate	Extra employment rate by leisure activities is moderately high compared with capture fisheries employment rate	Extra employment rate by leisure activities is similar to capture fisheries employment rate	Extra employment rate by leisure activities is moderately small compared with capture fisheries employment rate	Extra employment rate by leisure activities is small compared with capture fisheries employment rate	Extra employment rate by leisure activities is extremely small compared with capture fisheries employment rate
	• Accidents and disasters	• Fishing gear damage or ship damage by accident or disaster	Damaged fishing gear or ship is optimal condition	Fishing gear damage or ship damage is negligible	Fishing gear damage or ship damage is minor	Fishing gear damage or ship damage is moderate	Fishing gear damage or ship damage is major	Fishing gear damage or ship damage is severe	Fishing gear damage or ship damage is worst