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CONVERSION OF EXISTING SOUTHERN GULF ISLANDS (SGI) ECOSYSTEM MAPPING TO PROVINCIAL TEM STANDARDS

for:

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CONVERSION OF SGI ECOSYSTEM MAP TO TEM STANDARDS

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1.0 INTRODUCTION

The main objective of this project was to update the existing Southern Gulf Islands (SGI) ecosystem mapping (Greene 2004) to terrestrial ecosystem mapping (TEM) standards. The goal of this office-based exercise is to make the existing ecosystem mapping consistent with the rest of the TEM mapping completed in 2008 for the Coastal Douglas-fir (CDF) biogeoclimatic zone (Madrone 2008). Islands Trust requires this information in order to have a single, consistent ecosystem mapping platform for identification of Sensitive Ecosystems for identification of areas and properties of high conservation value.

2.0 METHODS

All coding used in the existing mapping was upgraded to TEM standards (RISC 1996; RISC 1998a; RISC 1998b; RISC 2000) where applicable (please refer to the below step-by-step methods provided below). Where this information could not be converted to TEM standards "User-defined" columns will be applied wherever possible to retain the detail from the original mapping. The final "cross-walk" conversion table for SGI ecosystem mapping to TEM standards is provided in Appendix 1.

Steps Applied for SGI Conversion to TEM:

1. Developed a "cross-walk" table to follow for consistent conversion of SGI ecosystem labels to TEM standards (Appendix 1).
2. Created a new, blank, provincial standard TEM workbook in Excel. Began transfer of data from SGI database to the TEM workbook (to create a TEM database).
3. Moved and checked columns with coding that would not change into TEM standard database (e.g. Polygon Number; BGC Zone; BGC Subzone; Ecosystem Deciles; and all terrain data provided including Terrain Deciles; Terrain Textures, Surficial Materials; Surficial Material Qualifiers; Surficial Expressions; Subterrain Textures; Subsurficial Material; Subsurface Expressions; Geomorphological Processes 1 and 2 and Qualifiers).
4. In original terrain mapping "LA" mapped as surficial material type but no "L" was mapped. Assumed that "LA" = "L" and changed where necessary (possibility that "LA" = "L^{A}" but as no other "L" was mapped this does not seem likely).
5. In original terrain mapping "WI" mapped as the Geomorphological Process. This was changed to "W" in Geomorphological Process column and "I" in Geomorphological Process Qualifier column.
6. The 2004 orthophotos were used to verify original mapping and coding. Checked a selection of originally mapped Site Units, Disturbance Types and Land Uses to determine the most appropriate TEM standard code to update the database.
7. Sorted data by BGC Zone (CWH first; CDF second) while completing steps 8 through 12 to avoid any confusion with site series labels.
8. Sorted original data by Site Units, then by Land Use and then by structural stage for all deciles (Table 1).
    a. All polygons with Land Use originally mapped had the Site Series and Mapcode columns updated based on the above table.
    b. Where necessary all changed codes had there structural stage updated based on TEM standards.

Table 1. Original SGI ecosystem mapping land use labels and updated codes used for TEM standards.

Original Land Use Label	Original Mapped Structural Stages	Updated Code
AF	3	Default to Site Unit
BC	0, 1, 2, 3	Changed to Mapcode UR
BL	0, 1, 2, 3	Structural stages 0 and 1 changed to Mapcode BA; structural stages 2 and 3 default to Site Unit
BR	0, 1, 2, 3	Changed to Mapcode RW
CF	2, 3, 5	Structural stages 2 and 3 changed to Mapcode CF; structural stage 5 default to Site Unit
CO	3	Changed to Mapcode CO
CV	3	Changed to Mapcode CV
DB	0, 2	Default to Site Unit
LD	2, 5	Structural stages 2 changed to Mapcode CF; structural stage 5 default to Site Unit
OF	2, 3	Default to Site Unit
PA	0	Changed to Mapcode UR
PL	3	Default to Site Unit
RR	1, 2, 4, 5, 6, 7	Changed to Mapcode RW
RZ	0, 1, 2, 3, 4, 5	Changed to Mapcode RZ
SF	2	Changed to Mapcode UR

9. Non Vegetated Site Units were changed to Anthropogenic TEM standard Units for all deciles and structural stages where updated where necessary.

10. Forested and Non-Sparsely Forested Site Units were changed to TEM standard ecosystem site series.

11. All modifiers were updated based on new TEM ecosystem label, original mapped Site Modifiers and original mapped Aspect (filled in both Site Series Number and Site Series Mapcode columns).

12. Check and update, where necessary, modifiers and structural stages based on TEM standard ecosystem site series (take into account assumed modifiers and modifiers listed in alphabetical order).
    a. When three Site Modifiers were used in original mapping or when two Site Modifiers were used in original mapping and the new TEM ecosystem site series included a modifier:
        - A Site Modifier from the original mapping was deleted (in all cases this modifier was "ta") → resulted in only two site modifiers as per TEM standards.
    b. In cases where the original mapped Site Modifier contradicted the original mapped Aspect the Aspect label was assumed to be correct (e.g. Aspect = "G" and Site Modifier = "sl" → without a warm or cool aspect cannot determine if "sl" should become "w" or "k" TEM standards modifier, therefore in these cases "sl" Site Modifier was deleted).
    c. In some cases originally mapped structural stages included "2d" → this was updated to TEM standards by moving the "d" into the substage column.
13. Added in stand composition modifiers "B" and "M" based on Fuel Type from original mapping (applied to all forested ecosystem with structural stages 4 – 7 in all deciles).
    a. "C" Stand Composition Modifier is assumed (same as with CDF TEM).
14. Added in tree canopy closure values based on Crown Closure from original mapping (applied to all forested ecosystem with structural stages 4 – 7 in all deciles).
15. Added in disturbance codes values based on Disturbance Type from original mapping (applied to whole polygon - all deciles).
16. Database QA using manual sorting, as the TEM Data Capture application (DC Tool) would not run the data.
17. Errors captured were updated. The most common error was where the exact same label was given to multiple deciles within the same polygon. Where this occurred, the deciles were combined and columns updated.
18. The Project and User Defined Columns worksheets were filled in where possible with the data provided.

19. Once the database was converted to TEM standards it was then imported into ArcGIS 9.3 and joined to the ecosystem polygons based on the unique polygon identifier. The revised database has a one-to-one relationship between the spatial and non-spatial datasets. Ecosystem Polygon Tag, Mapsheet Number and Ecosection fields were then populated.

3.0 LIMITATIONS AND RECOMMENDATIONS

1. No soil drainage data exists in the original mapping (this is a required field for TEM standards). These fields were left blank as requested, per communications with Kate Emmings (Islands Trust).
2. Based on orthophoto interpretation when ecosystems were updated based on originally mapped Site Unit and Land Use some ecosystem data appears to be lost, especially for Land Use labels BC, BR, RR and RZ. The majority of these originally mapped polygons were anthropogenic; however a portion of the polygon was typically naturally vegetated ecosystems. Ideally these polygons should be revisited using orthophotos and remapped to incorporate both the anthropogenic feature as well as the natural ecosystems at the correct deciles.
3. The Project worksheet is missing fields that we were not able to complete based on the information provided. We recommend that the remaining fields be filled in by the original ecosystem mapper.
4. Database QA using the TEM Data Capture application (DC Tool) did not occur as the program would not run the data. Therefore, all errors were attempted to be caught using manual sorting of the database. The most common error was where the exact same label was given to different deciles within the same polygon which occurred as labels were updated to TEM standards. However, in order to verify that all the errors were caught manually, we recommend running the data using the DC Tool.

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APPENDIX I

CONVERSION TABLE FOR SOUTHERN GULF ISLANDS (SGI) ECOSYSTEM DATABASE TO TEM STANDARD.

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Conversion Table for Southern Gulf Islands (SGI) Ecosystem Database to TEM Standards

Original SGI Ecosystem Mapping			TEM Standards		
Code	**Name/ Description**		**Code**	**Name/ Description**	**Comments**
Source			**Data Source**		
G	Ground		G	Ground	
P	Photo Interpretation		P	Photo Interpretation	
V	Visual		V	Visual	
N	Notes		V	Visual	Based on description within report as N being collected while in the field N appears to be most similar to V
Biogeoclimatic Unit (Zone/ Subzone/ Variant)			**BGC Zone, BGC Subzone and BGC Variant**		
CDFmm	Moist Maritime Coastal Douglas-fir Subzone		CDFmm	Moist Maritime Coastal Douglas-fir Subzone	
CWHxm1	Eastern Very Dry Maritime Coastal Western Hemlock Variant		CWHxm1	Eastern Very Dry Maritime Coastal Western Hemlock Variant	
Aspect			**Site Modifier**		
W	Warm (slopes >35% and between 135° and 285°)		z or w	Very steep warm aspect or moderately steep warm aspect	Used with original mapped Site Modifiers "hs", "sl" and "ss" to modify into TEM standard Site Modifiers "z" and "w".
C	Cool (slopes >35% and between 285° and 135°)		q or k	Very steep cool aspect or moderately steep cool aspect	Used with original mapped Site Modifiers "hs", "sl" and "ss" to modify into TEM standard Site Modifiers "q" and "k".
G	Gentle (slopes <35%)		j	Gentle slope	Added to all deciles where applicable and not assumed as part of ecosystem type. These included all wetlands; anthropogenic units – BA, GP, RO; OR and DO in CDF; DS and RS in CWH.

Conversion Table for Southern Gulf Islands (SGI) Ecosystem Database Update to TEM Standards (continued)

Original SGI Ecosystem Mapping			TEM Standards		
Code	**Name/ Description**		**Code**	**Name/ Description**	**Comments**
Site Units			**Site Series Number / Site Series Mapcode and Site Modifier (where necessary)**		
02	FdPl - Cladina		02	FdPl - Cladina	Mapped in CWHxm1
03	FdHw – Salal		03	FdHw – Salal	Mapped in CWHxm1
01	HwFd - Kindbergia		01	HwFd - Kindbergia	Mapped in CWHxm1
04	Fd – Sword fern		04	Fd – Sword fern	Mapped in CWHxm1
05	Cw – Sword fern		05	Cw – Sword fern	Mapped in CWHxm1
06	HwCw – Deer fern		06	HwCw – Deer fern	Mapped in CWHxm1
02	FdPl - Arbutus		02	FdPl - Arbutus	
50	Fd(Qg) – Saskatoon - Herbs		00/QBsx	Garry oak – Brome/mixed grasses	"s" and "x" Site Modifiers added to differentiate between originally mapped Site Unit 53 = QB
51	FdRa – Salal – Hairy honeysuckle		01/DSx	Fd - Salal	"x" Site Modifier added to differentiate between originally mapped Site Unit 01 and 52 = DS
01	Fd - Salal		01/DS	Fd - Salal	
52	Fd - Snowberry		01/DS	Fd - Salal	
03	Fd - Oniongrass		03/DO	Fd - Oniongrass	
04	FdBg – Oregon grape		04/DG	FdBg – Oregon grape	
53	Qg – Mixed grass		00/QB	Garry oak – Brome/mixed grasses	
05	CwFd - Kindbergia		05/RK	CwFd - Kindbergia	
06	CwBg - Foamflower		06/RF	CwBg - Foamflower	
07	Cw - Snowberry		07/RS	Cw - Snowberry	
08	Act – Red-osier dogwood		08/CD	Act – Red-osier dogwood	
09	Act - Willow		09/CW	Act - Willow	
10	Pl - Sphagnum		10/LS	Pl - Sphagnum	
11	Cw – Skunk cabbage		11/RC	Cw – Skunk cabbage	
12	Cw – Vanilla leaf		12/RV	Cw – Vanilla leaf	
13	Cw – Indian plum		13/RP	Cw – Indian plum	
14	Cw – Slough sedge		14/CS	Cw – Slough sedge	
60	Pond lily aquatic		OW	Shallow open water	
61	Juncus Marsh		Wm04	Common spike-rush marsh	
62	Bulrush marsh		Wm06	Great bulrush marsh	
63	Reed canarygrass marsh		CFy	Cultivated field	Appears to be seasonally flooded field. "y" Site Modifier added to account for the wetter than normal conditions

Conversion Table for Southern Gulf Islands (SGI) Ecosystem Database Update to TEM Standards (continued)

Original SGI Ecosystem Mapping			TEM Standards		
Code	**Name/ Description**		**Code**	**Name/ Description**	**Comments**
Site Units			**Site Series Number / Site Series Mapcode and Site Modifier (where necessary)**		
64	Cattail marsh		Wm05	Cattail marsh	
65	Sedge fen		Wf51	Sitka sedge – Peat-moss fen	Also mapped in CWHxm1
66	Shrub swamp		Ws51	Sitka willow – Pacific willow – Skunk cabbage swamp	
67	Hardhack swamp		Ws50	Hardhack – Sitka sedge swamp	
68	Seashore saltgrass tidal marsh		Em03	Seashore saltgrass	
69	Glasswort tidal flat		Em02	Glasswort – Sea milkwort	
70	Rock bluffs		RO; SC; 02/DA	Rock outcrop; Cladina – Wallace's selaginella; FdPl - Arbutus	RO mapped with originally mapped structural stage 1; SC mapped with originally mapped structural stage 2; 02/DA mapped with originally mapped structural stages 3-6. In order to differentiate between the RO and SC not mapped as part of Site Unit 70, RO as part of Site Unit 70 was mapped as structural stage 1a, while SC was mapped with a structural stage of 2b.
71	Rockmoss-Selaginalla		SC	Cladina – Wallace's selaginella	
72	Dunegrass		LM	Dunegrass – Beach pea	
73	Snowberry		OR	Oceanspray - Rose	
74	Camas-Herbs		FC	Fescue - Camas	
75	Juniper-Oak		GO	Garry oak - Oceanspray	
76	Miner's-lettuce-Beach pea		LMy	Dunegrass – Beach pea	"y" Site Modifier added to differentiate between originally mapped Site Unit 72 = LM
BE	Beach		BE	Beach	
BK	Breakwater		BK	Breakwater	* New Code (no structural stage or modifiers)
CB	Cutbank		CB	Cutbank	
CL	Cliff		CL	Cliff	
DM	Dam		RE	Reservoir	Same as in CDF TEM
DR	Drainage canal		CA	Canal	
ES	Exposed soil		ES	Exposed soil	
GB	Gravel bar		GB	Gravel bar	
GP	Gravel pit		GP	Gravel pit	

Conversion Table for Southern Gulf Islands (SGI) Ecosystem Database Update to TEM Standards (continued)

Original SGI Ecosystem Mapping			TEM Standards		
Code	**Name/ Description**		**Code**	**Name/ Description**	**Comments**
Site Units			**Site Series Number / Site Series Mapcode and Site Modifier (where necessary)**		
LA	Lake or reservoir		LA	Lake	
LG	Lagoon		OW	Shallow open water	
MU	Mudflat sediments		MU	Mudflat sediments	
OW	Shallow open water		OW	Shallow open water	
PD	Pond		PD	Pond	
RE	Reservoir		RE	Reservoir	
RI	River		RI	River	
RO	Bedrock		RO	Rock outcrop	
RZ	Road and right-of-way		RZ	Road surface	
TA	Talus		TA	Talus	
Site Modifiers			**Site Modifiers**		
an	anthropogenic				Deleted
dn	drained				Deleted
gu	gullied		g	Gullying occurring	
hs	hypersteep slope		z/q	Very steep warm aspect or very steep cool aspect	Used with original mapped Aspect "W" and "C" to modify into TEM standard Site Modifiers "z" and "q".
hu	hummocky		h	Hummocky terrain	
po	poor productivity				Deleted
rp	riparian				Deleted
rv	ravine		g	Gullying occurring	
sh	shallow		s	Shallow soils	
sl	slope		w/k	Warm/cool aspects with slopes from 35-100%	Used with original mapped Aspect "W" and "C" to modify into TEM standard Site Modifiers "w" and "k".
ss	steep slope		w/k	Warm/cool aspects with slopes from 35-100%	Used with original mapped Aspect "W" and "C" to modify into TEM standard Site Modifiers "w" and "k".
ta	blocky talus				Deleted

Conversion Table for Southern Gulf Islands (SGI) Ecosystem Database Update to TEM Standards (continued)

Original SGI Ecosystem Mapping			TEM Standards		
Code	**Name/ Description**		**Code**	**Name/ Description**	**Comments**
Structural Stage			**Structural Stage**		
1	Sparse/Bryoid		1	Sparse/Bryoid	Substage "a" added to RO mapped as originally mapped Site Unit 70.
2	Herb		2	Herb	Substage "b" added to SC mapped as originally mapped Site Unit 70 and Substage "d" added where originally mapped structural stage was "2d".
3	Shrub/Herb		3	Shrub/Herb	No substages used/added
4	Pole/Sapling		4	Pole/Sapling	
5	Young Forest		5	Young Forest	
6	Mature Forest		6	Mature Forest	
7	Old Forest		7	Old Forest	
Use			**Site Series Mapcode**		
AF	Air field				Map as updated site series
BC	Buildings, parking, landscaping; commercial		UR	Urban/Suburban	
BL	Barren land		BA; or updated site series	Barren; or updated site series	Use BA for originally mapped structural stages 0 and 1 and use updated site series for originally mapped structural stages 2 and 3
BR	Buildings, parking, landscaping; residential		RW	Rural	
CF	Cultivated field (active)		CF; or updated site series	Cultivated field; or updated site series	Use CF for originally mapped structural stages 2 and 3 and use updated site series for originally mapped structural stage 5
CO	Cultivated orchard		CO	Cultivated orchard	
CV	Cultivated vineyard		CV	Cultivated vineyard	
DB	Dam, breakwater				Map as updated site series
LD	Landscaped grass and shrubs		CF; or updated site series	Cultivated field; or updated site series	Use CF for originally mapped structural stage 2 and use updated site series for originally mapped structural stage 5
OF	Old field				Map as updated site series
PA	Parking lots		UR	Urban/Suburban	
PL	Powerline				Map as updated site series
RR	Rural		RW	Rural	

Conversion Table for Southern Gulf Islands (SGI) Ecosystem Database Update to TEM Standards (continued)

Original SGI Ecosystem Mapping			TEM Standards		
Code	**Name/ Description**		**Code**	**Name/ Description**	**Comments**
Use			**Site Series Mapcode**		
RZ	Road/trail right-of-way		RZ	Road surface	
SF	Sports facilities		UR	Urban/Suburban	
Disturbance Type			**Disturbance Classes and Subclasses**		
BIR	Bird trampling		B	Biotic effects	
CAC	Cleared – agriculture – current				Deleted – map as CF with no associated disturbance
CAH	Cleared – agriculture – historic				Deleted – map as updated site series with no associated disturbance
CUC	Cleared – undeveloped – current		Ll	Forest harvesting/ land clearing	
CUH	Cleared – undeveloped – historic		Ll	Forest harvesting/ land clearing	
DCC	Developed – commercial – current				Deleted
DCH	Developed – commercial – historic				Deleted
DFC	Developed – fields – current				Deleted
DHC	Developed – housing – current				Deleted
DHH	Developed – housing – historic				Deleted
DRC	Developed – rural – current				Deleted
DUC	Developed – utility corridor – current				Deleted
DUH	Developed – utility corridor – historic				Deleted
FIR	Fire – natural or prescribed		F	Fires	
GRZ	Grazing by animals (domestic or wild)		B	Biotic effects	
LGC	Logging – clearcut		Lc	Forest harvesting/ clearcut system	

Conversion Table for Southern Gulf Islands (SGI) Ecosystem Database Update to TEM Standards (continued)

Original SGI Ecosystem Mapping			TEM Standards		
Code	**Name/ Description**		**Code**	**Name/ Description**	**Comments**
Disturbance Type			**Disturbance Classes and Subclasses**		
LGS	Logging – selective		Le	Forest harvesting/ selection system	
ROT	Root rot		BpDR	Biotic effects/ disease/ root disease	Deleted
UNK	Unknown				Deleted
UNS	Unstable soil		Ts	Terrain-related effects/ terrain failures	Deleted
WIN	Windthrow		Aw	Atmosphere-related effects/ windthrow	Deleted
Tree Species			**Not Applicable**		
Stand Structure			**Not Applicable**		
Fuel Hazard			**Not Applicable**		
Crown Closure (%)			**Tree Crown Closure (%)**		
Fuel Type			**Stand Composition Modifier**		** "C" Stand Composition Modifier = assumed (same as CDF TEM)
NF	Non fuel				Deleted
C2	Coniferous, young forests with moderate to closed canopies and well developed ladder fuels				Deleted
C3	Coniferous, young forests with moderate to closed canopies				Deleted
C4	Coniferous pole sapling stands with moderate closed canopies				Deleted
C5	Coniferous, mature and old stands				Deleted
C7	Coniferous, pole sapling and young forest with open canopies				Deleted
D1	Deciduous stands		B	Broadleaf dominate canopy (greater than ¾)	
M2	Mixed deciduous/coniferous stands		M	Mixed canopy (neither conifer or broadleaf dominate - greater than ¾)	

Conversion Table for Southern Gulf Islands (SGI) Ecosystem Database Update to TEM Standards (continued)

Original SGI Ecosystem Mapping			TEM Standards		
Code	**Name/ Description**		**Code**	**Name/ Description**	**Comments**
Fuel Type			**Stand Composition Modifier**		** "C" Stand Composition Modifier = assumed (same as CDF TEM)
M2R	Young regenerating conifer stands				Deleted
Ola	Herb/shrubs, non-cured				Deleted
Olb	Herb/shrubs, cured				Deleted
Terrain texture			**Terrain texture**		
a	Blocks		a	Blocks	
b	Boulders		b	Boulders	
k	Cobbles		k	Cobbles	
p	Pebbles		p	Pebbles	
s	Sand		s	Sand	
z	Silt		z	Silt	
c	Clay		c	Clay	
e	Organic – fibric		e	Organic – fibric	
u	Organic – mesic		u	Organic – mesic	
h	Organic - humic		h	Organic - humic	
Surficial materials			**Surficial materials**		
A	Anthropogenic		A	Anthropogenic	
C	Colluvial		C	Colluvial	
D	Weathered bedrock		D	Weathered bedrock	
E	Loess		E	Loess	
F	Fluvial		F	Fluvial	
FG	Glaciofluvial		FG	Glaciofluvial	
LA	Lacustrine		L	Lacustrine	Assumed LA = L not L^A (see methodology above)
M	Morainal		M	Morainal	
O	Organic		O	Organic	
R	Bedrock		R	Bedrock	
W	Marine		W	Marine	
WG	Glaciomarine		WG	Glaciomarine	

Conversion Table for Southern Gulf Islands (SGI) Ecosystem Database Update to TEM Standards (continued)

Original SGI Ecosystem Mapping			TEM Standards		
Code	**Name/ Description**		**Code**	**Name/ Description**	**Comments**
Surface expression			**Surface expression**		
b	Blanket		b	Blanket	
f	Fan		f	Fan	
h	Hummocks		h	Hummocks	
m	Rolling		m	Rolling	
p	Plain		p	Plain	
r	Ridges		r	Ridges	
s	Steep slope		s	Steep slope	
t	Terrace		t	Terrace	
v	Veneer		v	Veneer	
w	Mantle		w	Mantle	
Geomorphological process			**Geomorphological process (and Qualifier)**		
V	Gully erosion		V	Gully erosion	
WI	Washing (inactive)		W (I)	Washing (inactive)	
R	Rapid mass movement		R	Rapid mass movement	