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Wetland Trends for Selected Areas of Dorchester County, Maryland and Vicinity (1981-82 to 1988-89)

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Wetland Trends for Selected Areas of Dorchester County, Maryland and Vicinity (1981-82 to 1988-89)

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INTRODUCTION

Wetlands are subjected to multiple impacts, both natural and human-induced. They may change from one type to another, e.g., emergent wetland to scrub-shrub wetland, due to natural succession or to minor filling or drainage. Timber harvest of palustrine forests also causes a change in wetland type to emergent and/or scrub-shrub wetlands. Wetlands are also destroyed, largely by human activities (direct or indirect). Most wetlands change more slowly over time. Knowledge of wetland losses and gains is important for evaluating the effect of government programs and policies designed to protect wetlands and for developing effective strategies to reverse undesirable trends.

The U.S. Environmental Protection Agency (EPA) and the U.S. Fish and Wildlife Service (FWS) provided funding to initiate quadrangle-based wetland trends studies for selected areas in the Chesapeake Bay watershed. These studies identify the extent and nature of small- and large-scale wetland alterations for selected local areas.

The purpose of this report is to present the findings of the wetland trends analysis study for selected areas of Dorchester County, Maryland and vicinity. It is one of numerous study areas selected by the EPA and FWS for detailed wetland trends analysis.

STUDY AREA

The study site is located in Dorchester County, Maryland and vicinity (Figure 1) and has a land surface area of 277 square miles. The study area encompasses six large-scale (1:24,000) U.S. Geological Survey topographic quadrangles: Blackwater River, Cambridge, Church Creek, Golden Hill, Preston, and Wingate.

METHODS

Wetland trends analysis involves comparing aerial photography from at least two time periods. For the present study, aerial photos from 1981-82 and from 1988-89 were examined and compared to determine the extent of the wetland changes (losses, gains, or changes in wetland type) that occurred during that time period in the study area.

The 1981-82 photography was 1:58,000 scale color infrared (CIR) aerial photography acquired by the U.S. Geological Survey's National High-Altitude Photography Program (NHAP). The 1988-89 photography was 1:40,000 scale CIR aerial photography acquired by the National Aerial Photography Program (NAPP). Wetlands and deepwater habitats were initially interpreted on the 1:58,000 photography and classified according to the Service's official wetland classification system (Cowardin, et. al. 1979) following standard NWI

mapping conventions (National Wetlands Inventory, 1990). These interpretations served as the basis for evaluating current wetland status and recent trends.

The two sets of photographs were compared using an Ottico Meccanica Italiana stereo facet plotter. Changes and map refinements were transferred to an NWI map using this device. Cause of change was recorded for each polygon. The minimum mapping unit for wetlands was generally 1/2 acre, except for ponds, which were mapped when 1/10th of an acre in size. Changes as small as 1/10th acre were detected. Improved wetland boundaries and previously undetected wetlands were added to the original maps. The larger scale and more apparent seasonal signs of wetland hydrology on the NAPP photos improved our ability to detect and classify wetlands. Field work was conducted to verify changes in classification in selected areas with questionable photographic signatures. These results were used to improve wetland mapping for the original time period, especially for temporarily flooded forested wetlands, and small wetlands that had been missed during the original interpretation. Quality control of all photointerpretation was performed by a second photointerpreter. Interpreted data were digitized and acreage summaries generated. Tables were then prepared to present the study's findings.

RESULTS

Current Status

In 1988-89, the study area possessed almost 85,000 acres of wetlands, excluding linear fringing wetlands along narrow streams. This total amounts to 47 percent of the area's land surface. Table 1 summarizes the acreage of the different wetland types found in the study area. Estuarine wetlands predominate, with about 47,000 acres. This represents about 56 percent of the study area's wetlands. Palustrine wetlands account for approximately 44 percent of the study area's wetlands, with almost 38,000 acres present. Forested wetlands are the most abundant palustrine type.

Recent Wetland Trends

The results of the wetland trends analysis study are presented in Tables 2 through 15. The following discussion highlights the more significant or interesting findings.

Vegetated Wetlands

Between 1981-82 and 1988-89, almost 988 acres of vegetated wetlands were lost in the study area. Eighty-nine percent of these changes involved filling wetlands to create land for development (upland) (Tables 2 and 3). Palustrine forested wetlands were the most adversely impacted with about 608 acres converted to upland (Table 4). Also significant was the loss of around 96 acres of estuarine vegetated wetlands to upland (Table 3). The major cause of wetland destruction was agriculture (Tables 5 and 6). Temporarily flooded wetlands received the brunt of the adverse impacts (Table 7), accounting for 75 percent of the total loss

of palustrine vegetated wetland. Change from one vegetated wetland type to another accounted for 73 percent of the total change in the original (1981-82) wetlands (Tables 2 and 3). Table 8 shows the causes of loss for palustrine forested wetlands in the study area.

Relative sea level rise and other factors (coastal subsidence and "controlled" fires) were responsible for close to 692 acres of vegetated wetland change. The vast majority of this change (about 579 acres) involved estuarine evergreen forested wetland. These loblolly pine (Pinus taeda) flatwoods bordering salt marshes showed increased evidence of salt stress (either partial or complete canopy die-off) or changed to estuarine marshes (Table 14). Apparent sea level rise subjected these flatwoods to frequent inundation by salt water to a degree exceeding the species' tolerance levels. The remaining 112 acres of vegetated wetlands were similarly affected, and exhibited a definite increase in both salinity and hydroperiod.

Further investigation is warranted to more fully explain the complicated dynamics involved in this apparent transgression of salt marshes into adjacent forested wetlands.

In addition to the losses of vegetated wetlands, there were some minor gains (Tables 9 and 10). Gains from other vegetated wetlands were most common. Ninety-seven percent of the gain from other vegetated wetlands involved timber harvests. Despite some slight gains in vegetated wetlands from nonvegetated wetlands, there was a net loss of about 985 acres of vegetated wetlands between 1981-82 and 1988-89.

Nonvegetated Wetlands

In marked contrast to the downward trend in vegetated wetlands, nonvegetated wetlands are increasing, largely due to pond construction. There was a net gain of about 201 acres in palustrine nonvegetated wetlands from uplands and vegetated wetlands between 1981-82 and 1988-89 (Tables 11 and 12). Almost all of this gain was attributed to the construction of freshwater ponds. Over 60 percent of the new ponds were excavated in vegetated wetlands, mainly palustrine forests. The remainder of the new ponds were created in uplands. Sixty-eight percent of the new upland ponds were created on farmland (Table 13).

Summary

The study area has approximately 47 percent of its land mass covered by wetlands. Wetlands totaling 85,000 acres (in 1988-89) were identified in the study area by the Service's National Wetlands Inventory. Estuarine wetland is the dominant type, representing 56 percent of the wetlands in the study area.

Between 1981-82 and 1988-89, the study area lost about 988 acres of vegetated wetlands, with roughly 878 acres converted to upland. Temporarily flooded palustrine forested wetland was the type most frequently converted to upland. Pond construction added about 174 acres of palustrine nonvegetated wetlands, but this gain was reduced to about 169 acres by pond losses to upland and vegetated wetlands. There was also a gain of close to four acres of estuarine nonvegetated wetland, while no loss of this type was observed.

The overall trend for the study area's wetlands was losses of vegetated wetlands and lesser gains in nonvegetated wetlands (mostly ponds). The significance of the increase in ponds to fish and wildlife species has not been assessed and remains a point for discussion. The losses of vegetated wetlands, however, represent known losses of valuable fish and wildlife habitats and areas providing other valued functions.

While this report documents recent trends in the study area's wetlands, it does not address changes in the quality of the remaining wetlands. As agricultural development increases, the quality of wetlands can be expected to deteriorate due to agricultural runoff, increased sedimentation, groundwater withdrawals, increased water pollution, and other factors, unless adequate safeguards are taken to protect not only the existence of wetlands, but their quality.

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REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service, Washington, DC. FWS/OBS-79/31. 103 pp.

National Wetlands Inventory. 1990. Photointerpretation Conventions for the National Wetlands Inventory. U.S. Fish and Wildlife Service, St. Petersburg, FL. 45 pp. plus appendices.

Figure 1. Location of Study Area - Selected Quadrangles in Dorchester County, Maryland and Vicinity, shaded below.

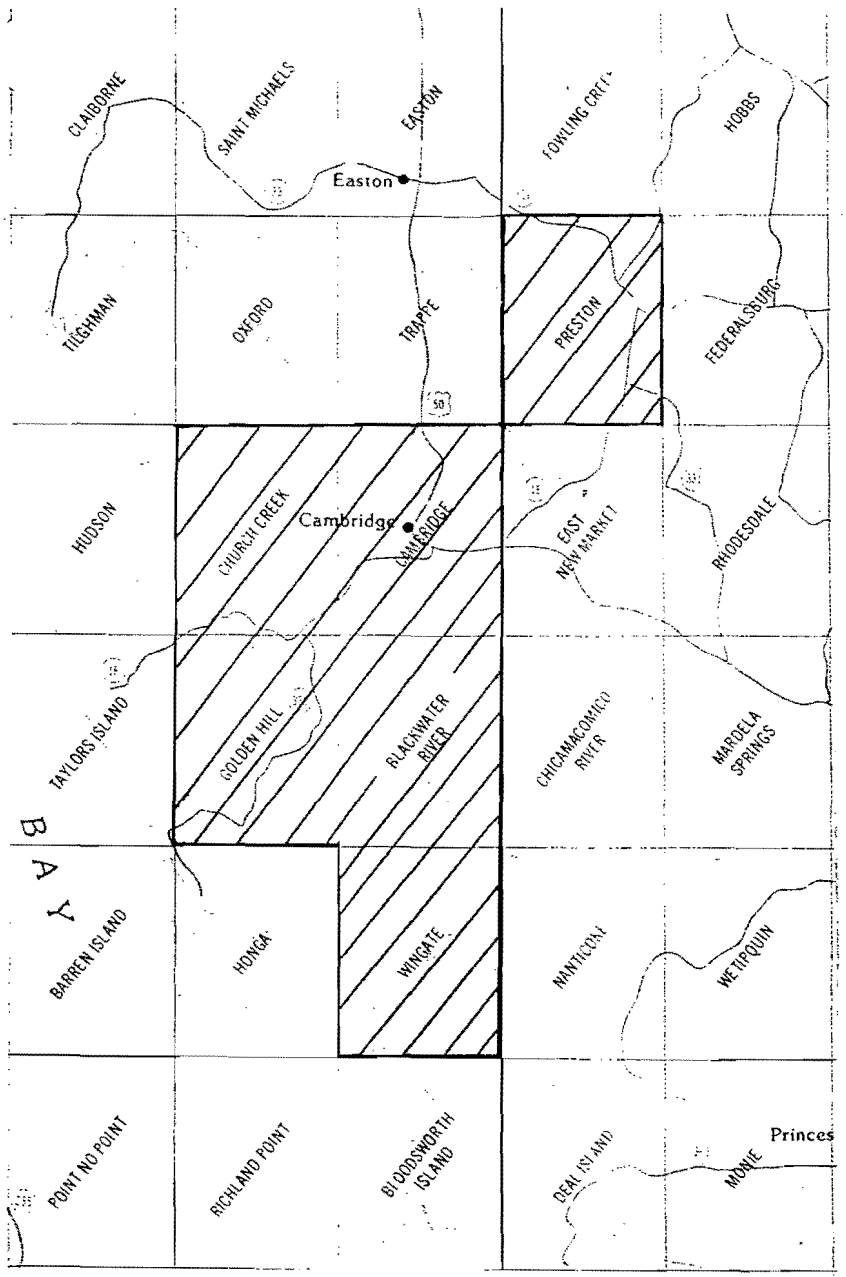

Table 1. Acreage of wetland types for selected areas of Dorchester County, Maryland and vicinity (1988-89).

Wetland Types	Acres
PALUSTRINE WETLANDS	
Tidal Emergent	
Seasonally Flooded-Tidal	222.59
Temporarily Flooded-Tidal	20.08
(Subtotal Tidal)	*(242.67)*
Nontidal Emergent	
Persistent	
Seasonally Flooded/Saturated	28.55
Seasonally Flooded	205.30
Temporarily Flooded	354.49
Semipermanently Flooded	77.74
Permanently Flooded	1.59
Intermittently Flooded	35.15
Nonpersistent	
Temporarily Flooded	16.66
(Subtotal Nontidal)	*(719.48)*
Total Palustrine Emergent Wetlands	**962.15**
Tidal Forested	
Deciduous	
Seasonally Flooded-Tidal	1,710.56
Temporarily Flooded-Tidal	219.96
Evergreen	
Seasonally Flooded-Tidal	87.64
Temporarily Flooded-Tidal	999.07
Permanently Flooded-Tidal	12.59
(Subtotal Tidal)	*(3,029.82)*
Nontidal Forested	
Deciduous	
Seasonally Flooded/Saturated	625.82
Seasonally Flooded	7,123.52
Temporarily Flooded	9,902.66
Semipermanently Flooded	2.02
Intermittently Flooded	218.29
Evergreen	
Seasonally Flooded/Saturated	23.33

Table 1 ***(Continued)***

Seasonally Flooded	600.43
Temporarily Flooded	10,820.09
Intermittently Flooded	32.81
(Subtotal Nontidal)	*(29,348.97)*
Dead	40.95
Total Palustrine Forested Wetlands	**32,419.74**
Tidal Scrub-Shrub	
Deciduous	
Seasonally Flooded-Tidal	622.34
Temporarily Flooded-Tidal	9.89
(Subtotal Tidal)	*(632.23)*
Nontidal Scrub-Shrub	
Deciduous	
Seasonally Flooded/Saturated	30.83
Seasonally Flooded	467.97
Temporarily Flooded	1,368.57
Semipermanently Flooded	2.50
Intermittently Flooded	17.69
Evergreen	
Seasonally Flooded	5.69
Temporarily Flooded	569.79
(Subtotal Nontidal)	*(2,463.04)*
Total Palustrine Scrub-Shrub Wetlands	**3,095.27**
Aquatic Bed	0.64
Total Palustrine Vegetated Wetlands	**36,477.80**
Unconsolidated Bottom (Ponds)	766.05
Unconsolidated Shore	10.57
Total Palustrine Nonvegetated Wetlands	**776.62**
GRAND TOTAL PALUSTRINE WETLANDS	**37,254.42**
ESTUARINE WETLANDS	
Emergent	
Persistent	
Regularly Flooded	185.13
Irregularly Flooded	6,266.14

Table 1 *(Continued)*

Unknown	28,771.87
Nonpersistent	
Regularly Flooded	18.20
Total Estuarine Emergent Wetlands	**35,241.34**
Scrub-Shrub	
Deciduous	
Irregularly Flooded	444.34
Evergreen	
Irregularly Flooded	89.67
Dead	11.28
Total Estuarine Scrub-Shrub Wetlands	**545.29**
Forested	
Deciduous	
Irregularly Flooded	293.41
Evergreen	
Irregularly Flooded	7,410.87
Dead	2,358.52
Total Estuarine Forested Wetlands	**10,062.80**
Total Estuarine Vegetated Wetlands	**45,849.43**
Unconsolidated Shore	1,246.69
Total Estuarine Nonvegetated Wetlands	**1,246.69**
GRAND TOTAL ESTUARINE WETLANDS	**47,096.12**
RIVERINE WETLANDS	
Emergent	
Regularly Flooded	24.59
GRAND TOTAL RIVERINE WETLANDS	**24.59**
LACUSTRINE WETLANDS	
Unconsolidated Shore	70.54
GRAND TOTAL LACUSTRINE WETLANDS	**70.54**
TOTAL WETLANDS	**84,445.67**

Table 2. Changes of palustrine vegetated wetlands in selected areas of Dorchester County, Maryland and vicinity (1981-82 to 1988-89).

Wetland Type	Converted to Upland (acres)	Changed to Other Palustrine Vegetated Wetlands* (acres)	Changed to Palustrine Nonvegetated Wetlands (acres)
Palustrine Emergent	63.13	17.31	38.01
Palustrine Forested	607.52	2,054.87	63.47
Palustrine Scrub-Shrub	111.40	---	3.77
Total	**782.05**	**2,072.18****	**105.25**

*Represents changes in class (e.g., emergent to scrub-shrub) but not changes in water regime within a given wetland class.

**Ninety-seven percent of this figure changed due to timber harvest.

Table 3. Changes of estuarine vegetated wetlands in selected areas of Dorchester County, Maryland and vicinity (1981-82 to 1988-89).

Wetland Type	Converted to Upland (acres)	Changed to Other Estuarine Vegetated Wetlands* (acres)	Changed to Estuarine Nonvegetated Wetlands (acres)
Estuarine Emergent	19.76	6.84	3.72
Estuarine Forested	75.31	169.19	---
Estuarine Scrub-Shrub	1.49	---	---
Total	**96.56**	**176.03**	**3.72**

*Represents changes in class (e.g., emergent to scrub-shrub) but not changes in water regime within a given wetland class.

Table 4. Changes in palustrine forested wetlands in selected areas of Dorchester County, Maryland and vicinity (1981-82 to 1988-89).

Forested Wetland Type	Converted to Upland (acres)	Changed to Other Wetland Types* (acres)	Total Loss (acres)
Temporarily Flooded*	435.06	1,764.07	2,199.13
Seasonally Flooded	96.61	330.01	426.62
Seasonally Flooded/Saturated	7.84	11.91	19.75
Temporarily Flooded - Tidal	68.01	58.63	126.64
Intermittently Flooded	---	25.89	25.89
Total	**607.52**	**2,190.60**	**2,798.03**

*Includes both changes in class (e.g., forested to scrub-shrub) and changes in water regime within a given class.

**Includes seasonally saturated types.

Table 5. Causes of estuarine vegetated wetland loss to upland in selected areas of Dorchester County, Maryland and vicinity (1981-82 to 1988-89).

Cause of Loss	Acres
Agriculture*	73.77
Unknown	6.77
Wildlife Improvement Project	6.43
Dredge Spoil Deposition	4.80
Marina Construction	3.73
Dam Construction	0.66
Recreational Facility	0.44
Total	**96.56**

*Includes crops for wildlife at regulated shooting areas.

Table 6. Causes of palustrine vegetated wetland loss to upland in selected areas of Dorchester County, Maryland and vicinity (1981-82 to 1988-89).

Cause of Loss	Acres
Agriculture*	683.04
Conversion to "Farmed Wetland"	28.01
Road Construction	18.22
Dam Construction for Farm Ponds	11.49
Unknown	7.91
Commercial Development	7.54
Housing	6.96
Wildlife Improvement Project	6.78
Ditching	4.68
Sand & Gravel Pits	3.58
Airport	2.11
Dam Construction for Urban Ponds	1.73
Total	**782.05**

*Includes crops for wildlife at regulated shooting areas.

Table 7. Conversion of hydrologically similar palustrine vegetated wetlands to upland in selected areas of Dorchester County, Maryland and vicinity (1981-82 to 1988-89).

Palustrine Wetland Type	Acres
Temporarily Flooded*	583.79
Seasonally Flooded	117.81
Seasonally Flooded/Saturated	7.84
Temporarily Flooded - Tidal	68.01
Seasonally Flooded - Tidal	4.60
Total	**782.05**

*Includes seasonally saturated types.

Table 8. Causes of loss in palustrine forested wetlands in selected areas of Dorchester County, Maryland and vicinity (1981-82 to 1988-89).

Palustrine Forested Wetland Type	Converted to Upland (acres)	Cause of Loss for PFO
Temporarily Flooded*	405.82	Agriculture**
	11.65	Road Construction
	6.23	Unknown
	6.78	Wildllife Improvement Project
	1.73	Dam Construction
	1.60	Commercial
	1.25	Housing
	435.06	**Subtotal**
Seasonally Flooded	88.36	Agriculture**
	6.57	Road Construction
	1.68	Unknown
	96.61	**Subtotal**
Seasonally Flooded/Saturated	7.84	Agriculture**
	7.84	**Subtotal**
Temporarily Flooded - Tidal	68.01	Agriculture**
	68.01	**Subtotal**
Total Palustrine Forested Wetland Loss	**607.52**	

*Includes seasonally saturated types.

**Includes crops for wildlife at regulated shooting areas.

Table 9. Gains in palustrine vegetated wetlands in selected areas of Dorchester County, Maryland and vicinity (1981-82 to 1988-89).

Wetland Type	Gain from Palustrine Nonvegetated Wetlands (acres)	Gain from Other Palustrine Vegetated Wetlands (acres)*
Palustrine Emergent	0.70	130.78
Palustrine Scrub-Shrub	---	1,941.40
Total	**0.70**	**2,072.18****

*Represents changes in class (e.g., emergent to scrub-shrub) but not changes in water regime within a given wetland class.

**Ninety-seven percent of this figure changed due to timber harvest.

Table 10. Gains in estuarine vegetated wetlands in selected areas of Dorchester County, Maryland and vicinity (1981-82 to 1988-89).

Wetland Type	Gain from Estuarine Nonvegetated Wetlands (acres)	Gain from Other Estuarine Vegetated Wetlands (acres)*
Estuarine Emergent	0.40	46.74
Estuarine Scrub-Shrub	---	129.29
Estuarine Aquatic Bed	1.47**	---
Total	**1.87**	**176.03**

*Represents changes in class (e.g., emergent to scrub-shrub) but not changes in water regime within a given wetland class.

**Gain from Estuarine Deepwater Habitat

Table 11. Gains and losses in palustrine nonvegetated wetlands in selected areas of Dorchester County, Maryland and vicinity (1981-82 to 1988-89).

	GAINS		LOSSES	
Wetland Type	Created From Upland (acres)	Created In Vegetated Wetlands (acres)	Converted to Upland (acres)	Changed to Vegetated Wetlands (acres)
Palustrine Unconsolidated Bottom	65.22	105.25	4.91	0.70
Palustrine Unconsolidated Shore	3.83	---	---	---
Total	**69.05**	**105.25**	**4.91**	**0.70**

Table 12. Gains and losses in estuarine nonvegetated wetlands in selected areas of Dorchester County, Maryland and vicinity (1981-82 to 1988-89).

	GAINS		LOSSES	
Wetland Type	Created From Upland (acres)	Created In Vegetated Wetlands (acres)	Converted to Upland (acres)	Changed to Vegetated Wetlands (acres)
Estuarine Unconsolidated Shore	---	3.72	---	---
Total	**—**	**3.72**	**—**	**—**

Table 13. Causes of recently constructed ponds on upland sites in selected areas of Dorchester County, Maryland and vicinity (1981-82 to 1988-89).

Causes	Pond Acreage Created
Farm Ponds	44.41
Ponds of Unknown Purpose	9.42
Sand & Gravel Pit Ponds	8.67
Ponds in Undeveloped Areas	2.72
Total	**65.22**

Table 14. Changes in vegetated wetlands due to relative sea level rise in selected areas of Dorchester County, Maryland and vicinity (1981-82 to 1988-89).

To: / From:	E2F04/5	E2F05	E2EM	E2FO4	E1	**Total**
E2F04	208.92	352.71	17.34	---	---	**578.97**
E2F05	---	2.80*	11.89	---	1.64	**16.33**
E2EM	---	---	1.34*	---	16.58	**17.92**
PF04A	---	---	---	72.26	6.30	**78.56**
Total	**208.92**	**355.51**	**30.57**	**72.26**	**24.52**	**691.78**

*Represents wetlands that were observed to be increasingly affected by relative sea level rise, as evidenced by changes in species composition and hydrology.

Table 15. Changes in estuarine forested wetlands in selected areas of Dorchester County, Maryland and vicinity (1981-82 to 1988-89).

To:	Upland	E2F05	E2EM	E2SS	E1	PF05	PUB	**Total Change**
From:								
E2F01	22.93	---	---	---	---	---	0.91†	**23.84**
E2F04**	46.30	407.77	34.85	122.45	7.50	6.04	3.42†	**628.33**
E2F05	6.08	---	11.89	---	1.64	4.38	9.13	**33.12**
All E2FO	**75.31**	**407.77**	**46.74**	**122.45**	**9.14**	**10.42***	**13.46**	**685.29 (894.21)****

* Converted to impounded deadwood swamp at Blackwater National Wildlife Refuge.

† Due to construction of farm ponds.

** A further 208.92 acres of E2F04 were seen to exhibit some canopy die-off as a result of relative sea level rise (E2F04 → E2F04/5). It is expected that these areas will eventually change to E2EM1.