



Supplement of

Multi-decadal floodplain classification and trend analysis in the Upper Columbia River valley, British Columbia

Italo Sampaio Rodrigues et al.

Correspondence to: Italo Sampaio Rodrigues (italo.rodrigues@uleth.ca)

The copyright of individual parts of the supplement might differ from the article licence.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22

Supplementary Material

1. Auxiliary Data

The followings are detailed descriptions of wetland-related datasets.

(i) The Historical Global Land Cover (created by the Hermosilla et al., 2022) is a high spatial resolution (30m) land cover maps for Canada’s ecosystems (1984-2019) (Overall accuracy of 80%). These time-series land cover maps were produced from annual time-series of Landsat image composites, forest change information, and ancillary topographic and hydrologic data. It was used (i) a refined training pool derived from existing land cover products using airborne and spaceborne measures of forest structure; (ii) selection of training samples proportionally to the land cover distribution using a distance weighted approach; and (iii) generation of regional classification models using a 150x150 km tiling system.

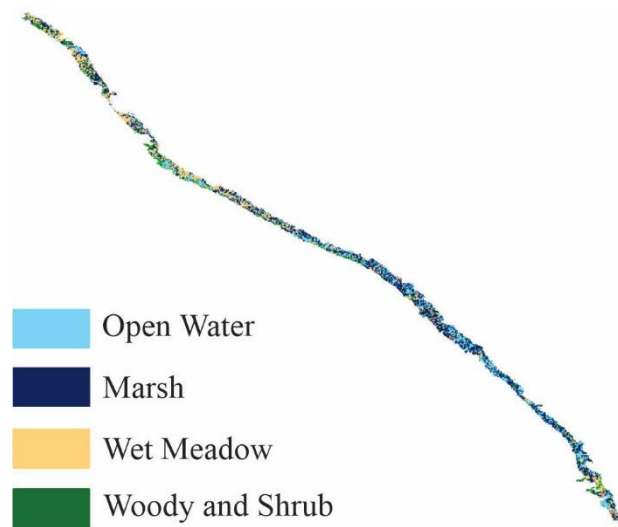
23 **2. Confusion matrix, total accuracy, omission, commission, and its corresponding classified raster**

24 **2.1. Season: April to mid-May**

25 **Table S1.** Confusion Matrix with commission and omission errors from April to mid-May 1984

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	97	3	0	0	100	0.03	88.0%	0.84
Marsh	0	82	18	0	100	0.18		
Wet meadow	0	10	89	1	100	0.11		
Woody/Shrub	0	6	10	84	100	0.16		
Marginal total	97	101	117	85	400			
Omission Error	0	0.19	0.24	0.01				

26



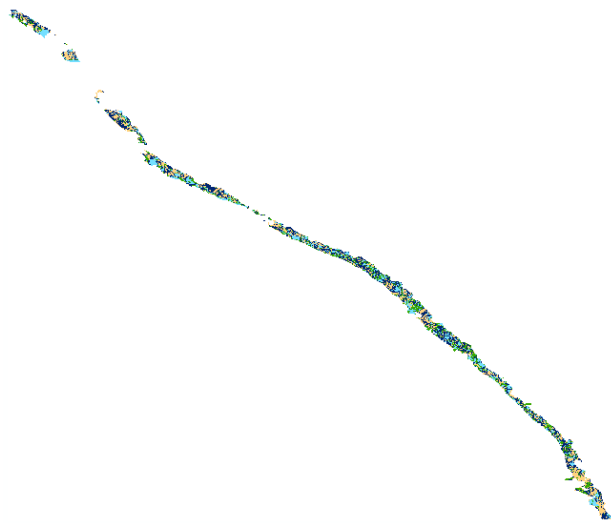
27

28

29 **Table S2.** Confusion Matrix with commission and omission errors from April to mid-May 1985

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	97	3	0	0	100	0.03	88.0%	0.84
Marsh	0	82	18	0	100	0.18		
Wet meadow	0	10	89	1	100	0.11		
Woody/Shrub	0	6	10	84	100	0.16		
Marginal total	97	101	117	85	400			
Omission Error	0	0.19	0.24	0.01				

30



31

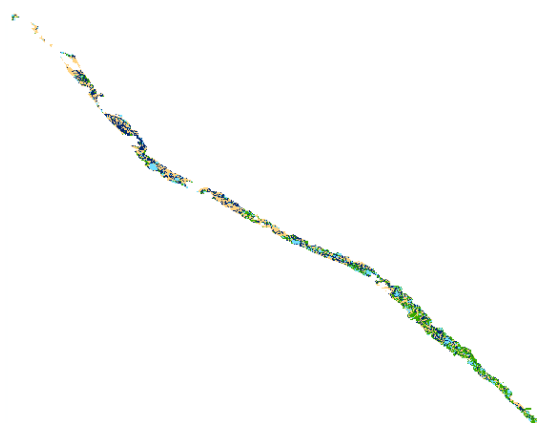
32

33

Table S3. Confusion Matrix with commission and omission errors from April to mid-May 1986

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	97	3	0	0	100	0.03	88.0%	0.84
Marsh	0	82	18	0	100	0.18		
Wet meadow	0	10	89	1	100	0.11		
Woody/Shrub	0	6	10	84	100	0.16		
Marginal total	97	101	117	85	400			
Omission Error	0	0.19	0.24	0.01				

34



35

36

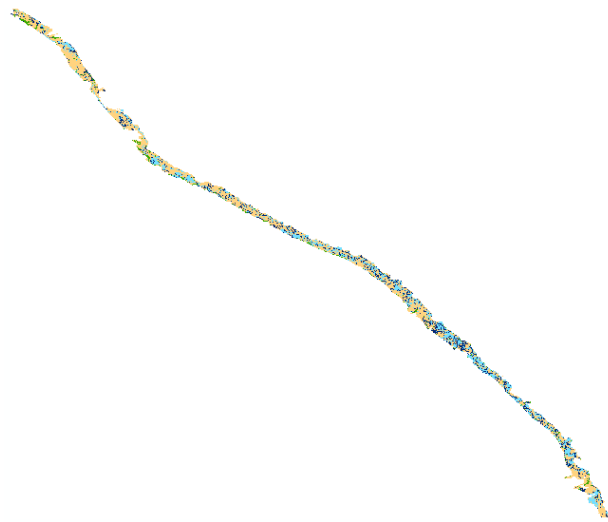
37

38

Table S4. Confusion Matrix with commission and omission errors from April to mid-May 1987

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	92	8	0	0	100	0.08	87.5%	0.83
Marsh	0	80	20	0	100	0.20		
Wet meadow	0	10	87	3	100	0.13		
Woody/Shrub	0	6	3	91	100	0.09		
Marginal total	92	104	110	94	400			
Omission Error	0	0.23	0.21	0.03				

39



40

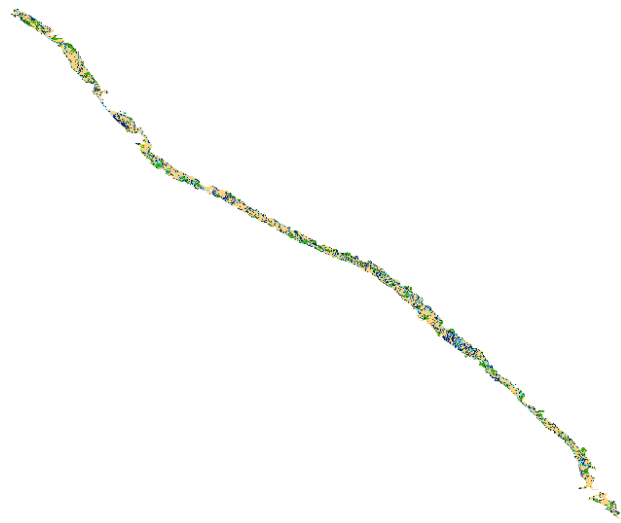
41

42

Table S5. Confusion Matrix with commission and omission errors from April to mid-May 1988

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	95	5	0	0	100	0.05	84.8%	0.80
Marsh	0	78	18	4	100	0.22		
Wet meadow	0	10	78	12	100	0.22		
Woody/Shrub	0	7	5	88	100	0.12		
Marginal total	95	100	101	104	400			
Omission Error	0	0.22	0.23	0.15				

43



44

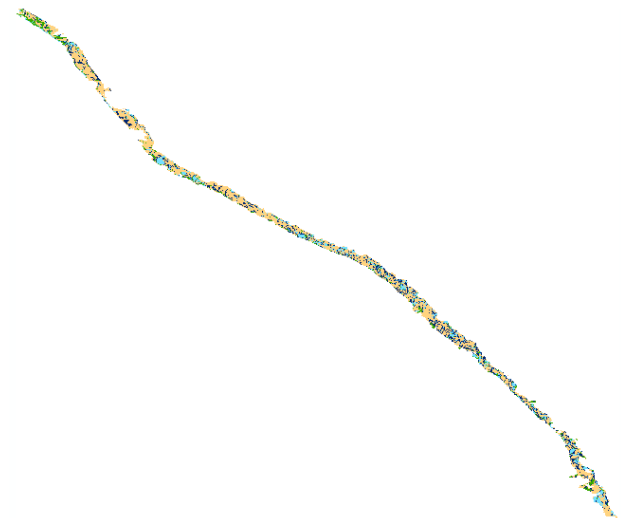
45

46

Table S6. Confusion Matrix with commission and omission errors from April to mid-May 1989

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	96	4	0	0	100	0.04	84.3%	0.79
Marsh	3	75	12	10	100	0.25		
Wet meadow	2	10	82	6	100	0.18		
Woody/Shrub	0	7	9	84	100	0.16		
Marginal total	101	96	103	100	400			
Omission Error	0.05	0.22	0.20	0.16				

47



48

49

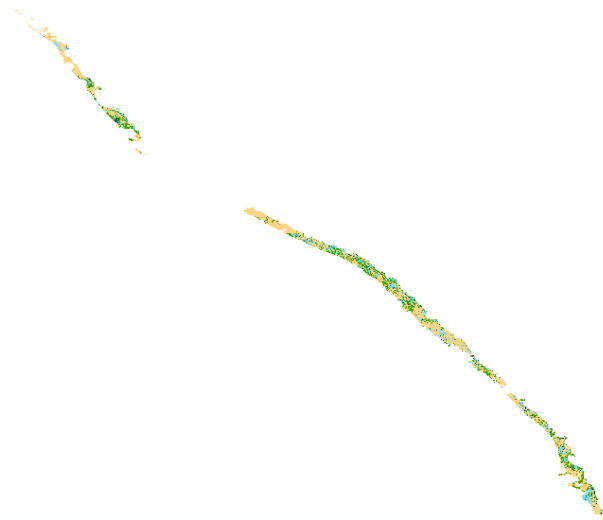
50

51

Table S7. Confusion Matrix with commission and omission errors from April to mid-May 1990

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	90	6	4	0	100	0.10	88.3%	0.84
Marsh	3	86	4	7	100	0.14		
Wet meadow	2	10	86	2	100	0.14		
Woody/Shrub	0	4	5	91	100	0.09		
Marginal total	95	106	99	100	400			
Omission Error	0.05	0.19	0.13	0.09				

52



53

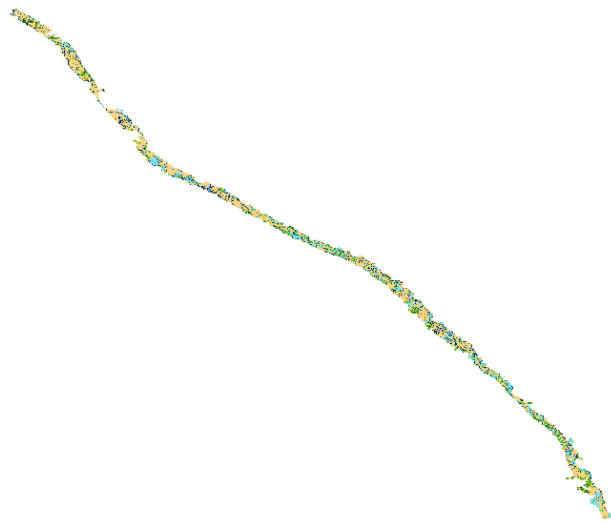
54

55

Table S8. Confusion Matrix with commission and omission errors from April to mid-May 1991

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	86	5	9	0	100	0.14	87.3%	0.83
Marsh	5	88	3	4	100	0.12		
Wet meadow	2	7	89	2	100	0.11		
Woody/Shrub	0	9	5	86	100	0.14		
Marginal total	93	109	106	92	400			
Omission Error	0.08	0.19	0.16	0.07				

56



57

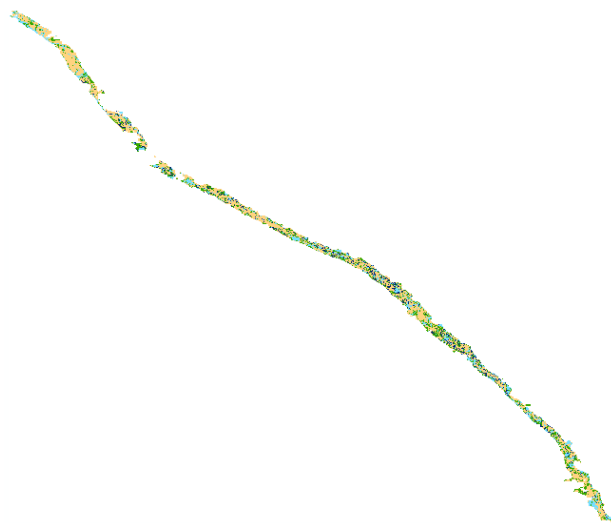
58

59

Table S9. Confusion Matrix with commission and omission errors from April to mid-May 1992

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	51	5	4	0	60	0.15	86.7%	0.82
Marsh	3	50	0	7	60	0.17		
Wet meadow	0	3	54	3	60	0.10		
Woody/Shrub	0	2	5	53	60	0.12		
Marginal total	54	60	63	63	240			
Omission Error	0.06	0.17	0.14	0.16				

60



61

62

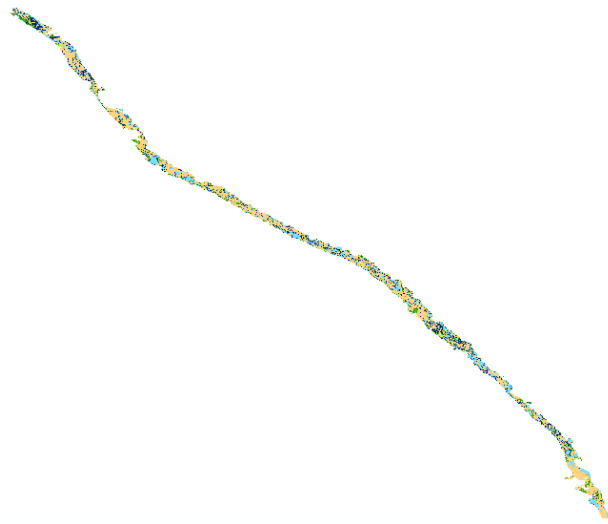
63

64

Table S10. Confusion Matrix with commission and omission errors from April to mid-May 1993

Classes	Water	Marsh	Wet meadow	Woody/ Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	50	5	5	0	60	0.17	85.4%	0.81
Marsh	3	50	0	7	60	0.17		
Wet meadow	0	3	54	3	60	0.10		
Woody/Shrub	0	3	6	51	60	0.15		
Marginal total	53	61	65	61	240			
Omission Error	0.06	0.18	0.17	0.16				

65



66

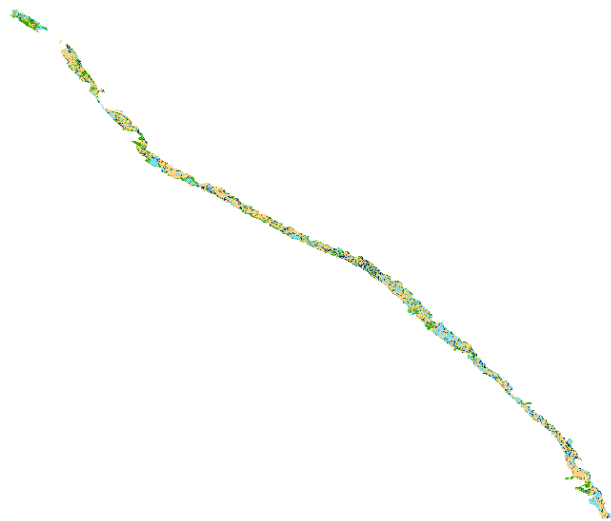
67

68

Table S11. Confusion Matrix with commission and omission errors from April to mid-May 1994

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	55	3	2	0	60	0.08	88.3%	0.84
Marsh	1	54	0	5	60	0.10		
Wet meadow	0	4	52	4	60	0.13		
Woody/Shrub	0	4	5	51	60	0.15		
Marginal total	56	65	59	60	240			
Omission Error	0.02	0.17	0.12	0.15				

69



70

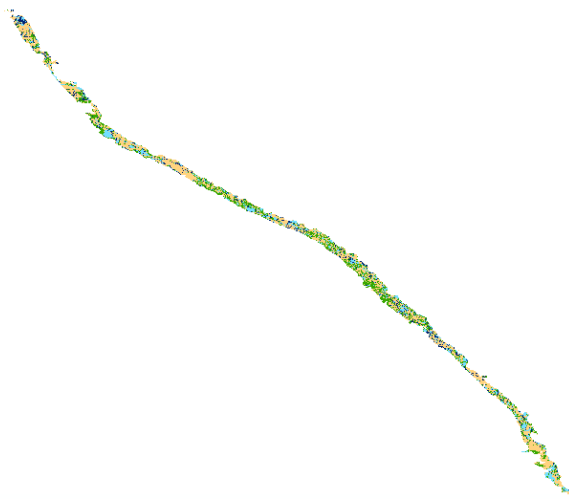
71

72

Table S12. Confusion Matrix with commission and omission errors from April to mid-May 1995

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	53	5	2	0	60	0.12	87.9%	0.84
Marsh	1	53	1	5	60	0.12		
Wet meadow	0	5	50	5	60	0.17		
Woody/Shrub	0	3	2	55	60	0.08		
Marginal total	54	66	55	65	240			
Omission Error	0.02	0.20	0.09	0.15				

73



74

75

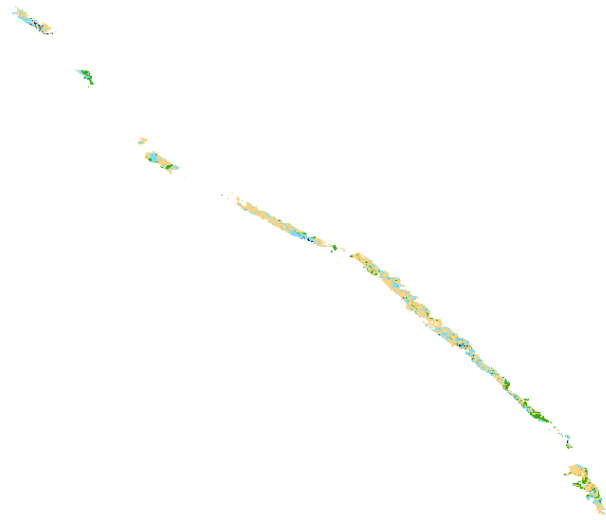
76

77

Table S13. Confusion Matrix with commission and omission errors from April to mid-May 1996

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	51	5	4	0	60	0.15	88.8%	0.85
Marsh	1	57	1	1	60	0.05		
Wet meadow	1	3	55	1	60	0.08		
Woody/Shrub	0	5	5	50	60	0.17		
Marginal total	53	70	65	52	240			
Omission Error	0.04	0.19	0.15	0.04				

78



79

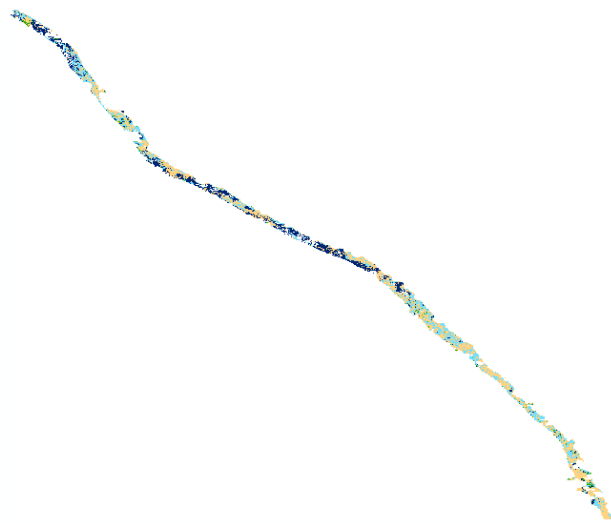
80

81

Table S14. Confusion Matrix with commission and omission errors from April to mid-May 1997

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	51	5	4	0	60	0.15	84.6%	0.79
Marsh	3	49	2	6	60	0.18		
Wet meadow	1	4	50	5	60	0.17		
Woody/Shrub	0	4	3	53	60	0.12		
Marginal total	55	62	59	64	240			
Omission Error	0.07	0.21	0.15	0.17				

82



83

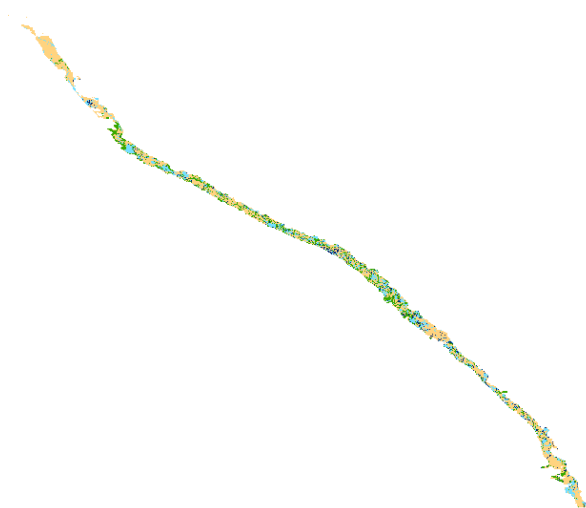
84

85

Table S15. Confusion Matrix with commission and omission errors from April to mid-May 1998

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	53	4	3	0	60	0.12	89.2%	0.86
Marsh	1	55	0	4	60	0.08		
Wet meadow	0	4	52	4	60	0.13		
Woody/Shrub	0	2	4	54	60	0.10		
Marginal total	54	65	59	62	240			
Omission Error	0.02	0.15	0.12	0.13				

86



87

88

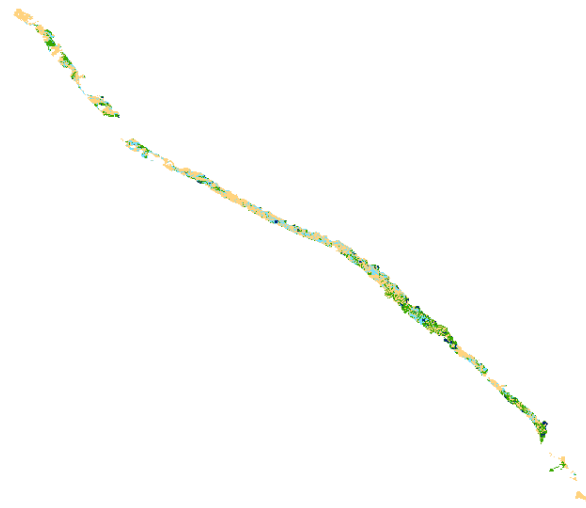
89

90

Table S16. Confusion Matrix with commission and omission errors from April to mid-May 1999

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	52	4	3	1	60	0.13	84.6%	0.79
Marsh	1	53	1	5	60	0.12		
Wet meadow	1	5	50	4	60	0.17		
Woody/Shrub	1	5	6	48	60	0.20		
Marginal total	55	67	60	58	240			
Omission Error	0.05	0.21	0.17	0.17				

91



92

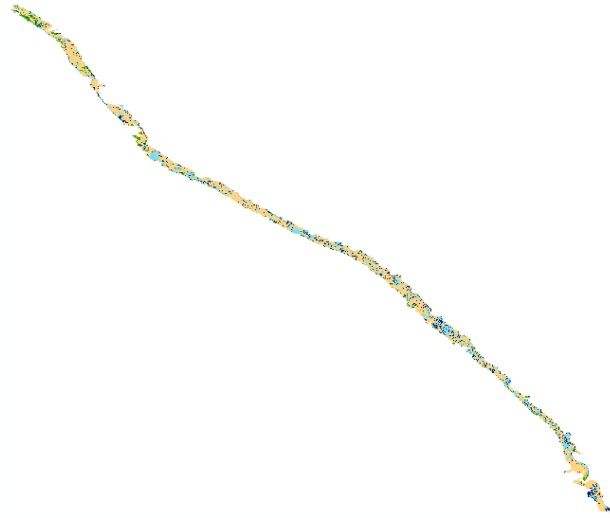
93

94

Table S17. Confusion Matrix with commission and omission errors from April to mid-May 2001

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	57	1	2	0	60	0.05	90.8%	0.88
Marsh	1	51	2	6	60	0.15		
Wet meadow	0	3	55	2	60	0.08		
Woody/Shrub	0	2	3	55	60	0.08		
Marginal total	58	57	62	63	240			
Omission Error	0.02	0.11	0.11	0.13				

95



96

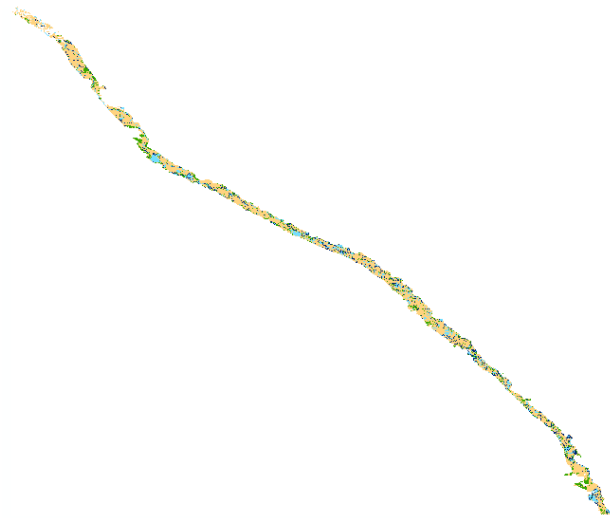
97

98

Table S18. Confusion Matrix with commission and omission errors from April to mid-May 2002

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	53	3	4	0	60	0.12	87.9%	0.84
Marsh	1	52	0	7	60	0.13		
Wet meadow	0	4	52	4	60	0.13		
Woody/Shrub	0	4	2	54	60	0.10		
Marginal total	54	63	58	65	240			
Omission Error	0.02	0.17	0.10	0.17				

99



100

101

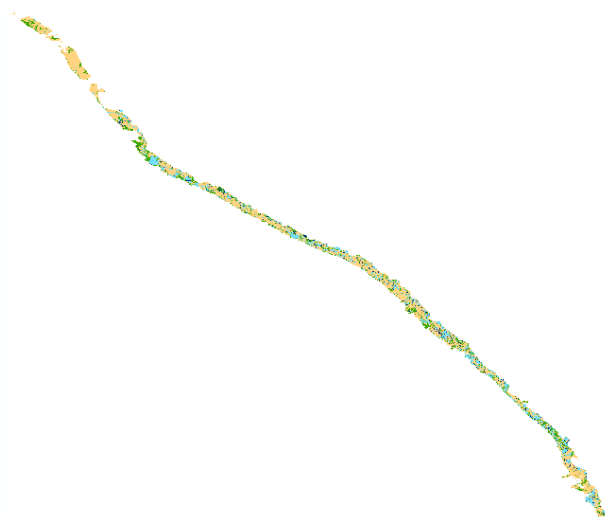
102

103

Table S19. Confusion Matrix with commission and omission errors from April to mid-May 2003

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	50	5	4	0	59	0.15	83.7%	0.78
Marsh	1	51	3	5	60	0.15		
Wet meadow	0	4	50	6	60	0.17		
Woody/Shrub	0	6	5	49	60	0.18		
Marginal total	51	66	62	60	239			
Omission Error	0.02	0.23	0.19	0.18				

104



105

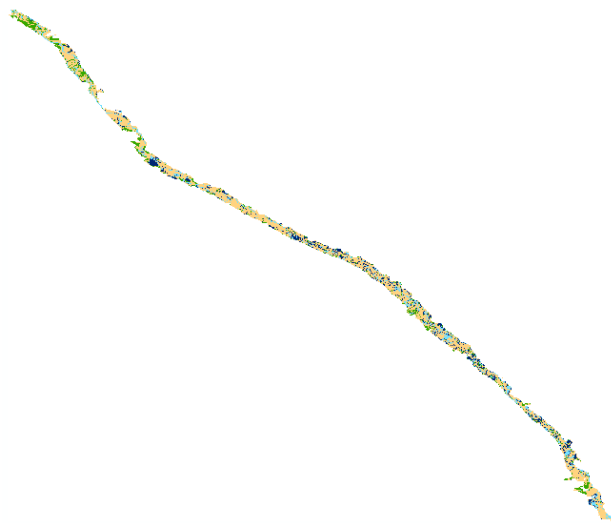
106

107

Table S20. Confusion Matrix with commission and omission errors from April to mid-May 2004

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	50	4	6	0	60	0.17	85.8%	0.81
Marsh	1	51	1	7	60	0.15		
Wet meadow	0	4	52	4	60	0.13		
Woody/Shrub	0	4	3	53	60	0.12		
Marginal total	51	63	62	64	240			
Omission Error	0.02	0.19	0.16	0.17				

108



109

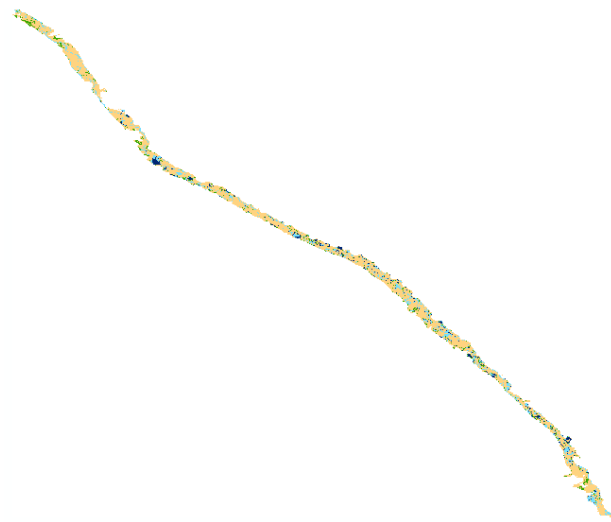
110

111

Table S21. Confusion Matrix with commission and omission errors from April to mid-May 2005

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	87	7	6	0	100	0.13	88.5%	0.85
Marsh	5	88	7	0	100	0.12		
Wet meadow	2	3	91	4	100	0.09		
Woody/Shrub	0	8	4	88	100	0.12		
Marginal total	94	106	108	92	400			
Omission Error	0.07	0.17	0.16	0.04				

112



113

114

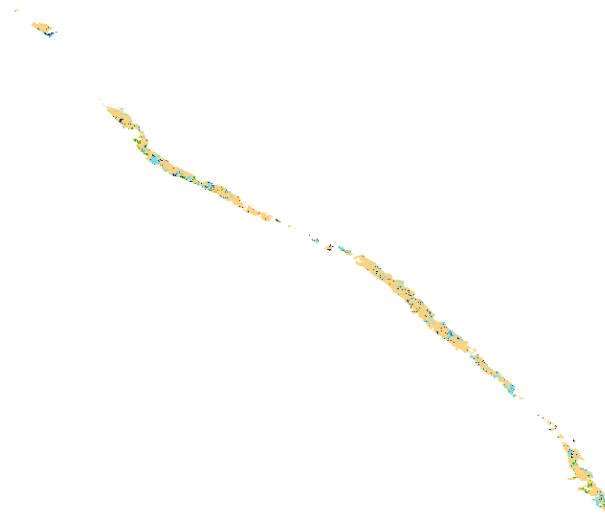
115

116

Table S22. Confusion Matrix with commission and omission errors from April to mid-May 2006

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	50	5	5	0	60	0.17	86.3%	0.82
Marsh	1	54	0	5	60	0.10		
Wet meadow	0	4	52	4	60	0.13		
Woody/Shrub	0	4	5	51	60	0.15		
Marginal total	51	67	62	60	240			
Omission Error	0.02	0.19	0.16	0.15				

117



118

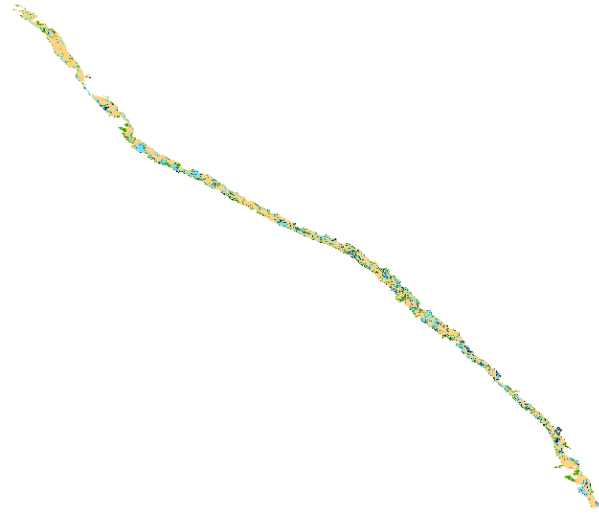
119

120

Table S23. Confusion Matrix with commission and omission errors from April to mid-May 2007

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	89	6	5	0	100	0.11	89.0%	0.85
Marsh	3	93	3	1	100	0.07		
Wet meadow	2	6	88	4	100	0.12		
Woody/Shrub	0	8	6	86	100	0.14		
Marginal total	94	113	102	91	400			
Omission Error	0.05	0.18	0.14	0.05				

121



122

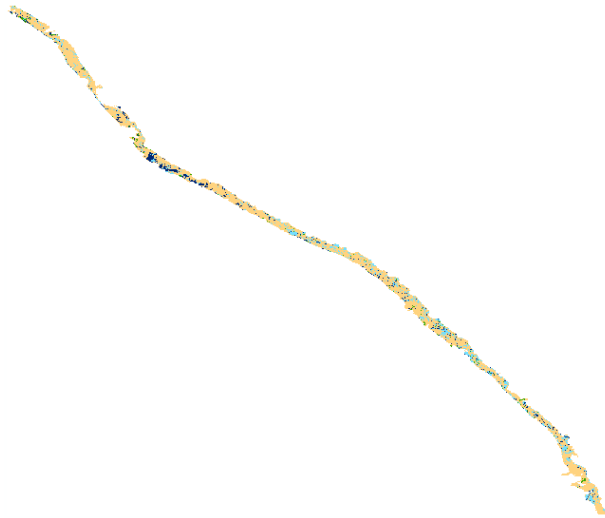
123

124

Table S24. Confusion Matrix with commission and omission errors from April to mid-May 2008

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	54	5	1	0	60	0.10	88.3%	0.84
Marsh	1	53	0	5	59	0.10		
Wet meadow	0	4	55	1	60	0.08		
Woody/Shrub	2	4	5	49	60	0.18		
Marginal total	57	66	61	55	239			
Omission Error	0.05	0.20	0.10	0.11				

125



126

127

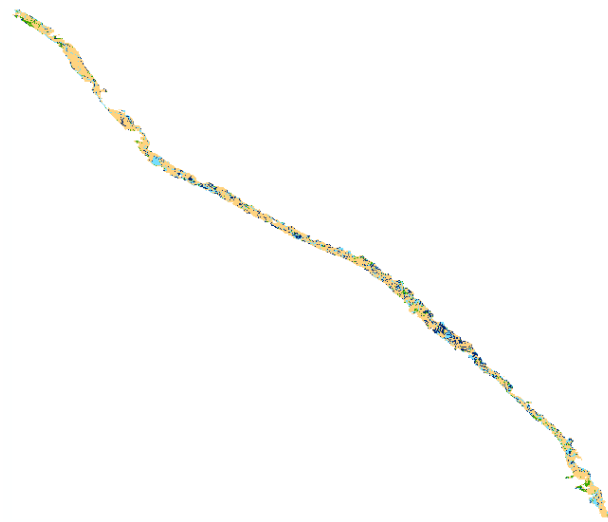
128

129

Table S25. Confusion Matrix with commission and omission errors from April to mid-May 2009

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	88	4	8	0	100	0.12	87.8%	0.84
Marsh	2	91	3	4	100	0.09		
Wet meadow	4	5	83	8	100	0.17		
Woody/Shrub	0	2	9	89	100	0.11		
Marginal total	94	102	103	101	400			
Omission Error	0.06	0.11	0.19	0.12				

130



131

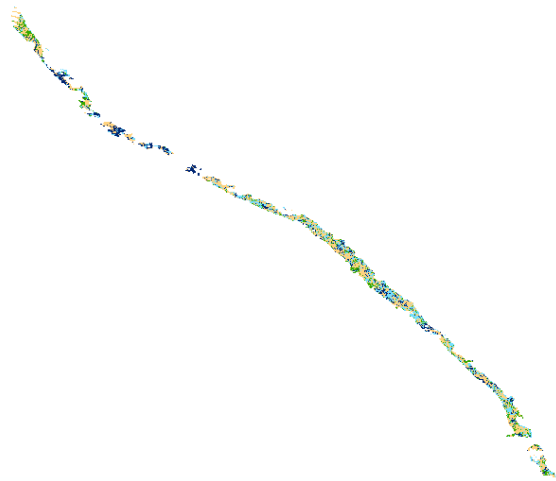
132

133

Table S26. Confusion Matrix with commission and omission errors from April to mid-May 2010

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	50	5	5	0	60	0.17	82.1%	0.76
Marsh	1	49	0	10	60	0.18		
Wet meadow	2	6	48	4	60	0.20		
Woody/Shrub	1	4	5	50	60	0.17		
Marginal total	54	64	58	64	240			
Omission Error	0.07	0.23	0.17	0.22				

134



135

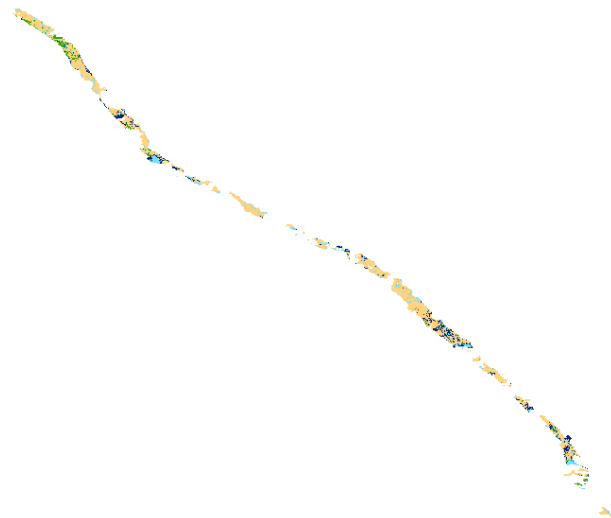
136

137

Table S27. Confusion Matrix with commission and omission errors from April to mid-May 2011

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	52	5	3	0	60	0.13	85.4%	0.81
Marsh	1	54	0	5	60	0.10		
Wet meadow	0	4	50	6	60	0.17		
Woody/Shrub	0	4	7	49	60	0.18		
Marginal total	53	67	60	60	240			
Omission Error	0.02	0.19	0.17	0.18				

138



139

140

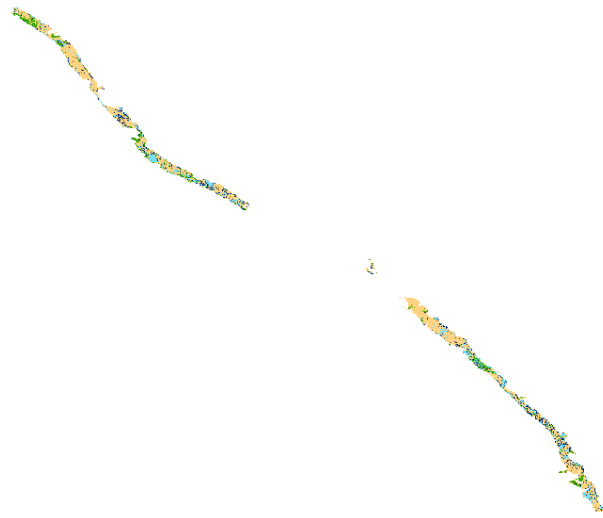
141

142

Table S28. Confusion Matrix with commission and omission errors from April to mid-May 2013

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	50	5	4	1	60	0.17	87.6%	0.83
Marsh	1	55	0	4	60	0.08		
Wet meadow	0	4	54	4	62	0.13		
Woody/Shrub	1	1	5	53	60	0.12		
Marginal total	52	65	63	62	242			
Omission Error	0.04	0.15	0.14	0.15				

143



144

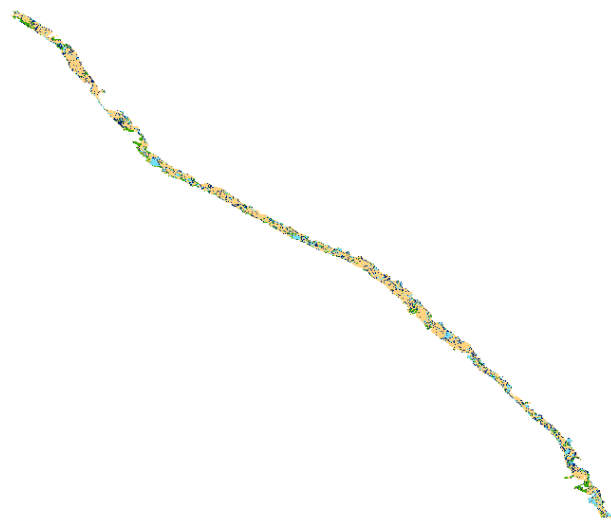
145

146

Table S29. Confusion Matrix with commission and omission errors from April to mid-May 2014

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	50	5	4	1	60	0.17	86.3%	0.82
Marsh	1	57	1	1	60	0.05		
Wet meadow	0	5	50	5	60	0.17		
Woody/Shrub	1	4	5	50	60	0.17		
Marginal total	52	71	60	57	240			
Omission Error	0.04	0.20	0.17	0.12				

147



148

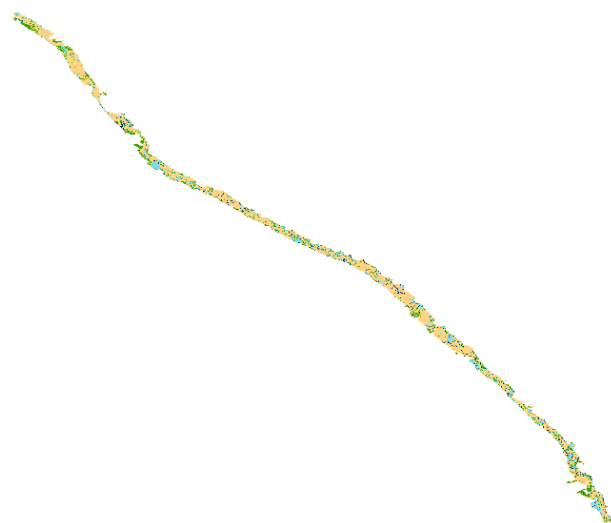
149

150

Table S30. Confusion Matrix with commission and omission errors from April to mid-May 2015

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	51	5	4	0	60	0.15	85.0%	0.80
Marsh	2	53	0	5	60	0.12		
Wet meadow	0	4	50	6	60	0.17		
Woody/Shrub	0	5	5	50	60	0.17		
Marginal total	53	67	59	61	240			
Omission Error	0.04	0.21	0.15	0.18				

151



152

153

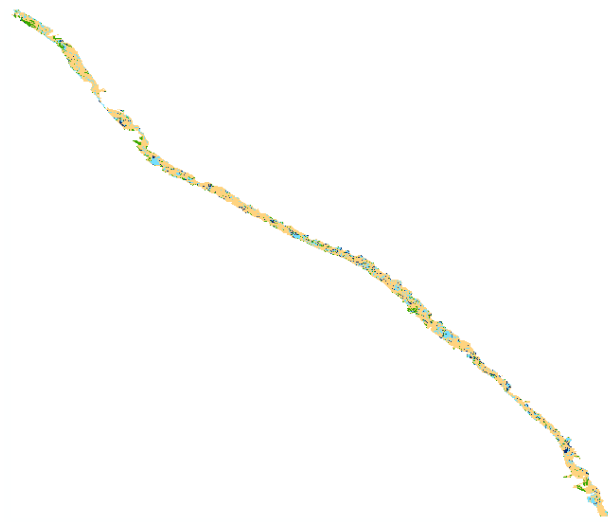
154

155

Table S31. Confusion Matrix with commission and omission errors from April to mid-May 2016

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	89	3	8	0	100	0.11	90.0%	0.87
Marsh	3	92	5	0	100	0.08		
Wet meadow	4	4	89	3	100	0.11		
Woody/Shrub	0	3	7	90	100	0.10		
Marginal total	96	102	109	93	400			
Omission Error	0.07	0.10	0.18	0.03				

156



157

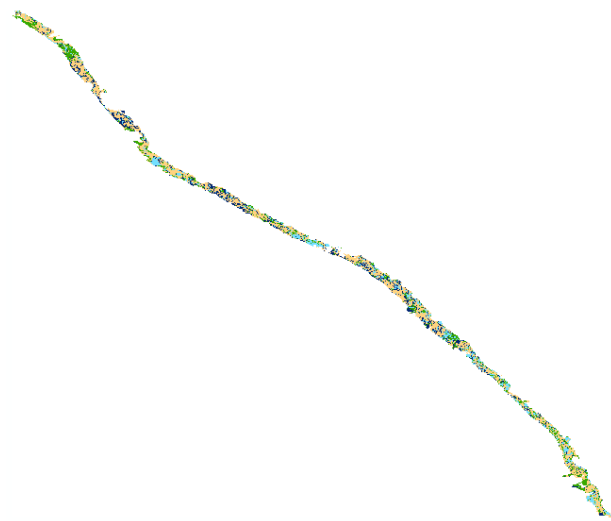
158

159

Table S32. Confusion Matrix with commission and omission errors from April to mid-May 2017

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	91	2	7	0	100	0.09	88.0%	0.84
Marsh	3	87	10	0	100	0.13		
Wet meadow	5	5	88	2	100	0.12		
Woody/Shrub	0	4	10	86	100	0.14		
Marginal total	99	98	115	88	400			
Omission Error	0.08	0.11	0.23	0.02				

160



161

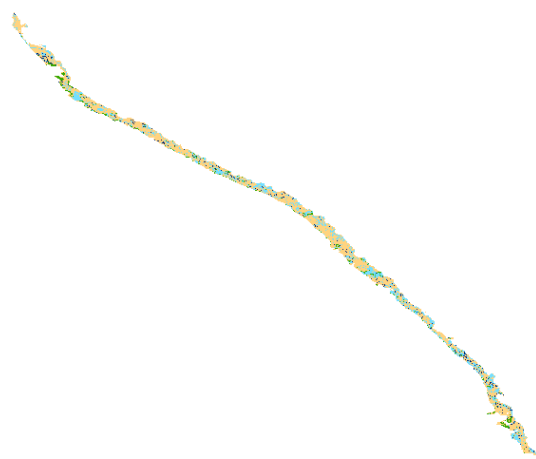
162

163

Table S33. Confusion Matrix with commission and omission errors from April to mid-May 2018

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	88	4	8	0	100	0.12	86.5%	0.82
Marsh	2	89	9	0	100	0.11		
Wet meadow	5	7	85	3	100	0.15		
Woody/Shrub	0	5	11	84	100	0.16		
Marginal total	95	105	113	87	400			
Omission Error	0.07	0.15	0.25	0.03				

164



165

166

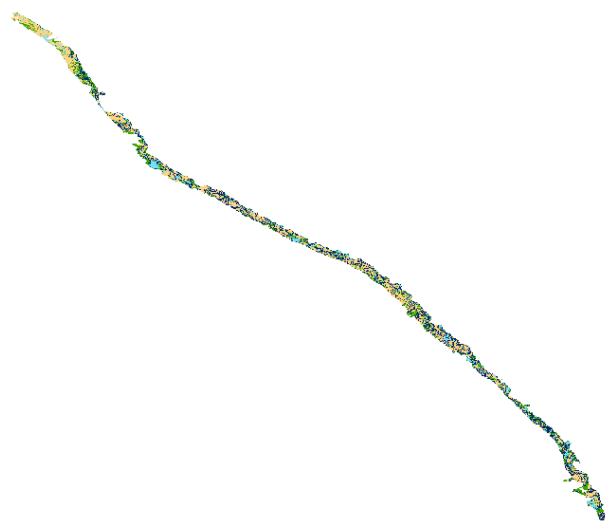
167

168

Table S34. Confusion Matrix with commission and omission errors from April to mid-May 2019

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	90	3	7	0	100	0.10	89.3%	0.86
Marsh	2	91	7	0	100	0.09		
Wet meadow	4	7	87	2	100	0.13		
Woody/Shrub	0	3	8	89	100	0.11		
Marginal total	96	104	109	91	400			
Omission Error	0.06	0.13	0.20	0.02				

169



170

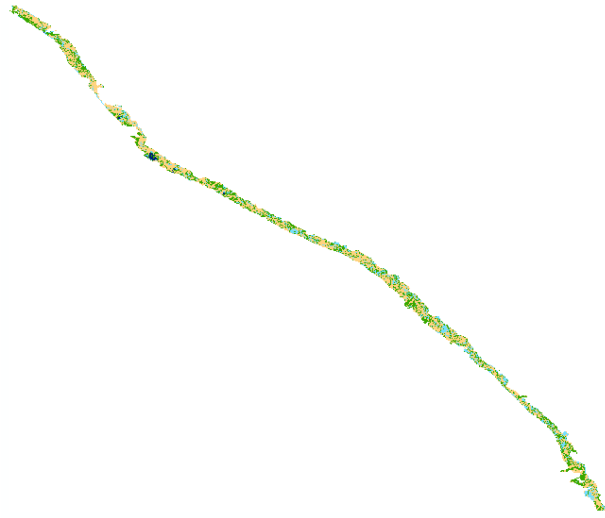
171

172

Table S35. Confusion Matrix with commission and omission errors from April to mid-May 2020

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	88	4	8	0	100	0.12	87.5%	0.83
Marsh	6	89	5	0	100	0.11		
Wet meadow	5	8	85	2	100	0.15		
Woody/Shrub	0	6	6	88	100	0.12		
Marginal total	99	107	104	90	400			
Omission Error	0.11	0.17	0.18	0.02				

173



174

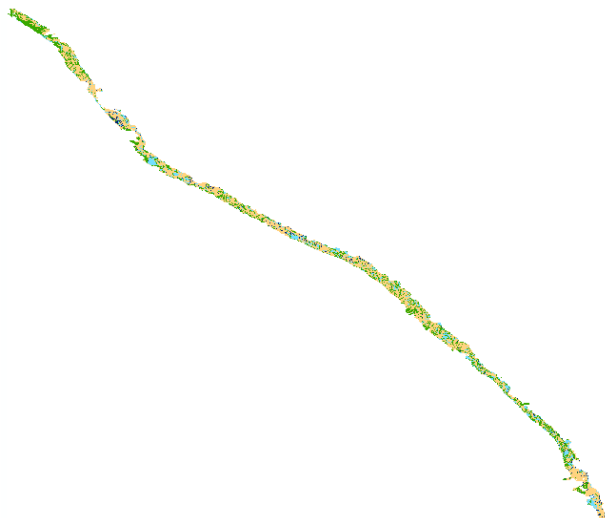
175

176

Table S36. Confusion Matrix with commission and omission errors from April to mid-May 2021

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	88	5	7	0	100	0.12	88.3%	0.84
Marsh	6	88	6	0	100	0.12		
Wet meadow	3	5	90	2	100	0.10		
Woody/Shrub	0	6	7	87	100	0.13		
Marginal total	97	104	110	89	400			
Omission Error	0.09	0.15	0.18	0.02				

177



178

179

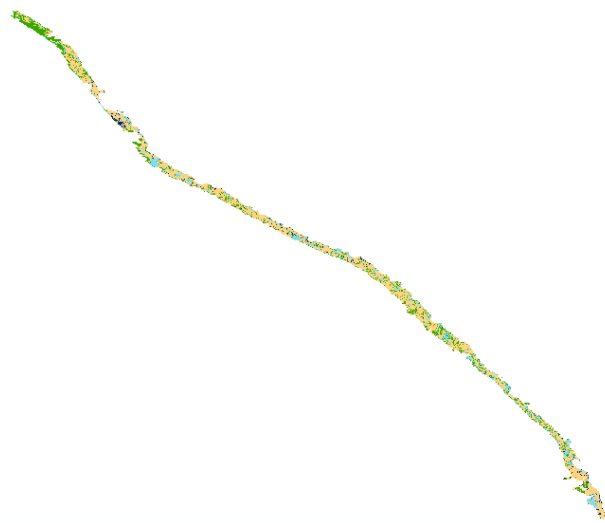
180

181

Table S37. Confusion Matrix with commission and omission errors from April to mid-May 2022

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	90	4	6	0	100	0.10	89.8%	0.86
Marsh	3	92	5	0	100	0.08		
Wet meadow	4	4	88	4	100	0.12		
Woody/Shrub	0	5	6	89	100	0.11		
Marginal total	97	105	105	93	400			
Omission Error	0.07	0.12	0.16	0.04				

182



183

184

2.2. Season: Late-May to July

186

Table S38. Confusion Matrix with commission and omission errors from late-May to July 1984

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	97	3	0	0	100	0.03	91.3%	0.88
Marsh	6	89	5	0	100	0.11		
Wet meadow	0	4	93	3	100	0.07		
Woody/Shrub	0	6	8	86	100	0.14		
Marginal total	103	102	106	89	400			
Omission Error	0.06	0.13	0.12	0.03				

188

189

190

191

Table S39. Confusion Matrix with commission and omission errors from late-May to July 1986

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	92	4	4	0	100	0.08		
Marsh	2	89	9	0	100	0.11		
Wet meadow	3	6	90	1	100	0.10	89.8%	0.86
Woody/Shrub	0	2	10	88	100	0.12		
Marginal total	97	101	113	89	400			
Omission Error	0.05	0.12	0.20	0.01				

192

193

194

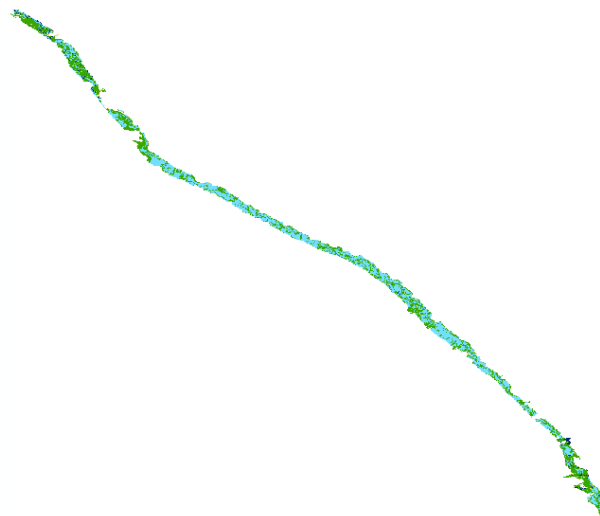
195

196

Table S40. Confusion Matrix with commission and omission errors from late-May to July 1987

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	94	4	2	0	100	0.06	88.0%	0.84
Marsh	10	80	10	0	100	0.20		
Wet meadow	0	10	87	3	100	0.13		
Woody/Shrub	0	6	3	91	100	0.09		
Marginal total	104	100	102	94	400			
Omission Error	0.10	0.20	0.15	0.03				

197



198

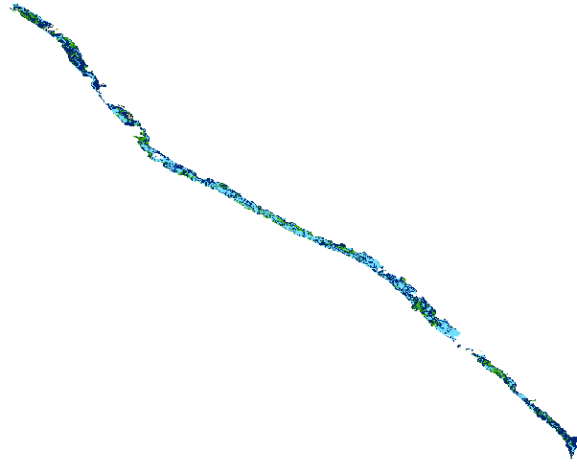
199

200

Table S41. Confusion Matrix with commission and omission errors from late-May to July 1988

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	95	5	0	0	100	0.05	87.8%	0.84
Marsh	0	82	12	6	100	0.18		
Wet meadow	0	9	83	8	100	0.17		
Woody/Shrub	0	4	5	91	100	0.09		
Marginal total	95	100	100	105	400			
Omission Error	0	0.18	0.17	0.13				

201



202

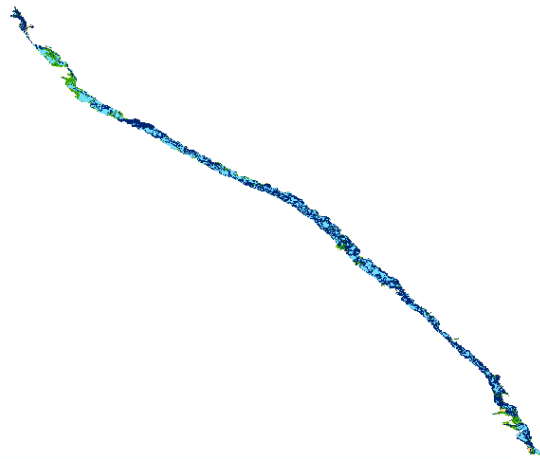
203

204

Table S42. Confusion Matrix with commission and omission errors from late-May to July 1990

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	94	2	4	0	100	0.06		
Marsh	2	88	3	7	100	0.12		
Wet meadow	1	9	88	2	100	0.12	90.0%	0.87
Woody/Shrub	0	4	6	90	100	0.10		
Marginal total	97	103	101	99	400			
Omission Error	0.03	0.15	0.13	0.09				

205



206

207

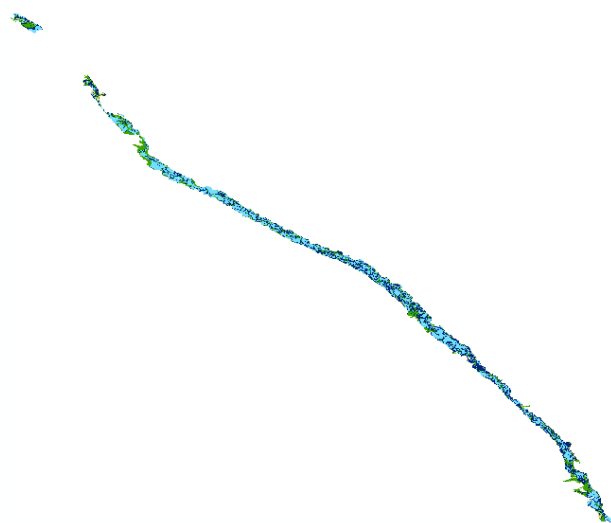
208

209

Table S43. Confusion Matrix with commission and omission errors from late-May to July 1991

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	90	6	4	0	100	0.10	89.0%	0.85
Marsh	6	86	4	4	100	0.14		
Wet meadow	0	7	91	2	100	0.09		
Woody/Shrub	0	7	4	89	100	0.11		
Marginal total	96	106	103	95	400			
Omission Error	0.06	0.19	0.12	0.06				

210



211

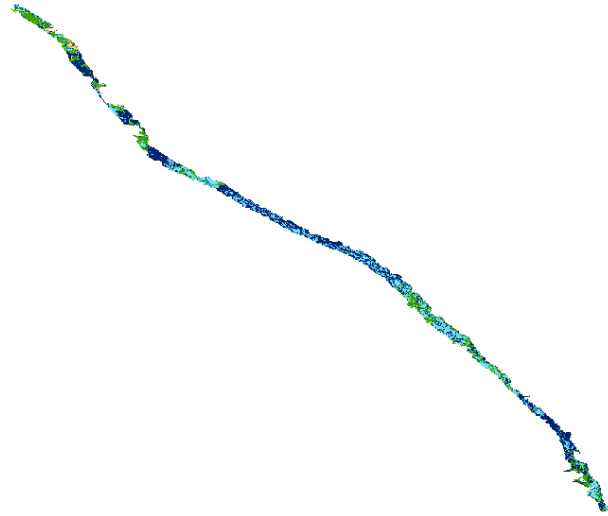
212

213

Table S44. Confusion Matrix with commission and omission errors from late-May to July 1992

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	55	1	4	0	60	0.08	90.8%	0.88
Marsh	1	56	0	3	60	0.07		
Wet meadow	0	4	53	3	60	0.12		
Woody/Shrub	0	3	3	54	60	0.10		
Marginal total	56	64	60	60	240			
Omission Error	0.02	0.13	0.12	0.10				

214



215

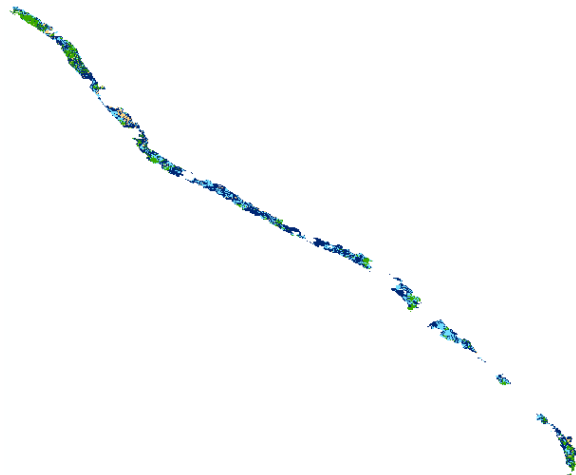
216

217

Table S45. Confusion Matrix with commission and omission errors from late-May to July 1993

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	56	1	3	0	60	0.07	90.4%	0.87
Marsh	1	57	0	2	60	0.05		
Wet meadow	0	2	54	4	60	0.10		
Woody/Shrub	0	5	5	50	60	0.17		
Marginal total	57	65	62	56	240			
Omission Error	0.02	0.12	0.13	0.11				

218



219

220

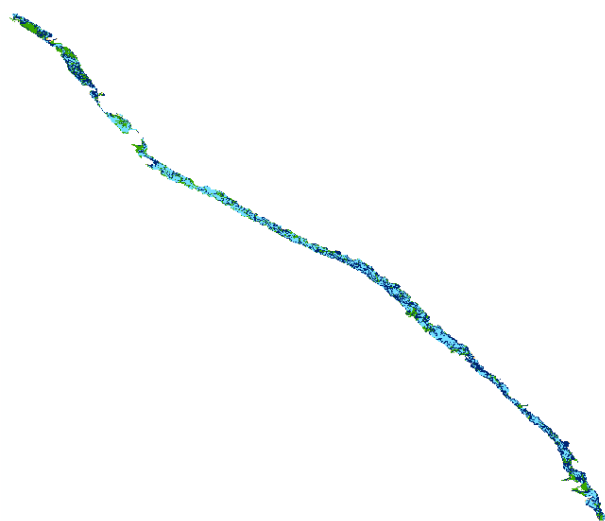
221

222

Table S46. Confusion Matrix with commission and omission errors from late-May to July 1994

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	57	1	2	0	60	0.05	90.4%	0.87
Marsh	1	55	4	0	60	0.08		
Wet meadow	0	3	54	3	60	0.10		
Woody/Shrub	0	4	5	51	60	0.15		
Marginal total	58	63	65	54	240			
Omission Error	0.02	0.13	0.17	0.06				

223



224

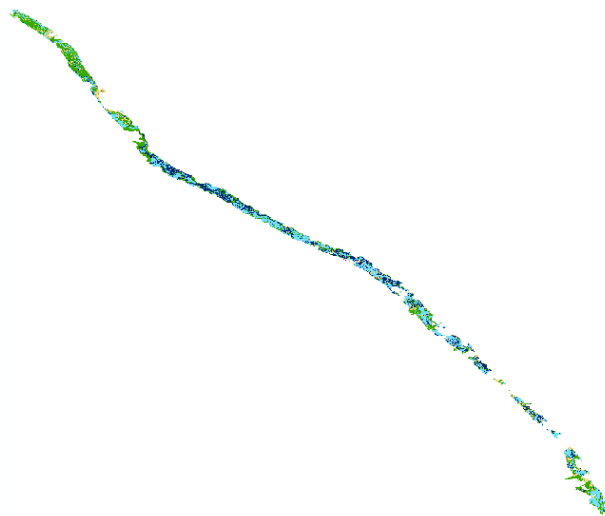
225

226

Table S47. Confusion Matrix with commission and omission errors from late-May to July 1995

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	56	3	1	0	60	0.07	89.6%	0.86
Marsh	1	55	0	4	60	0.08		
Wet meadow	0	4	52	4	60	0.13		
Woody/Shrub	0	4	4	52	60	0.13		
Marginal total	57	66	57	60	240			
Omission Error	0.02	0.17	0.09	0.13				

227



228

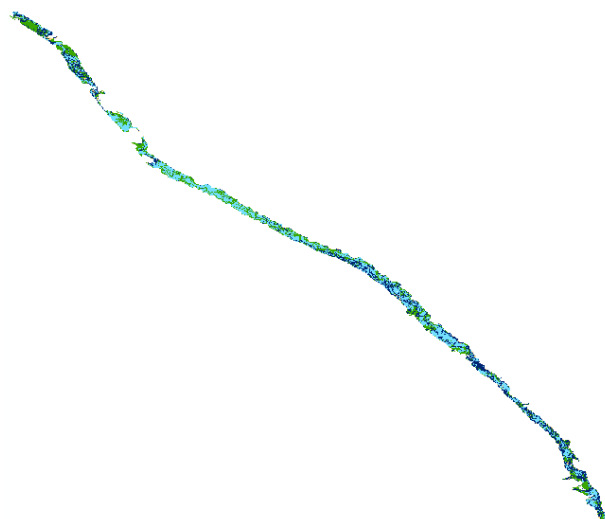
229

230

Table S48. Confusion Matrix with commission and omission errors from late-May to July 1996

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	54	3	3	0	60	0.10	90.0%	0.87
Marsh	1	54	0	5	60	0.10		
Wet meadow	0	3	54	3	60	0.10		
Woody/Shrub	0	3	3	54	60	0.10		
Marginal total	55	63	60	62	240			
Omission Error	0.02	0.14	0.10	0.13				

231



232

233

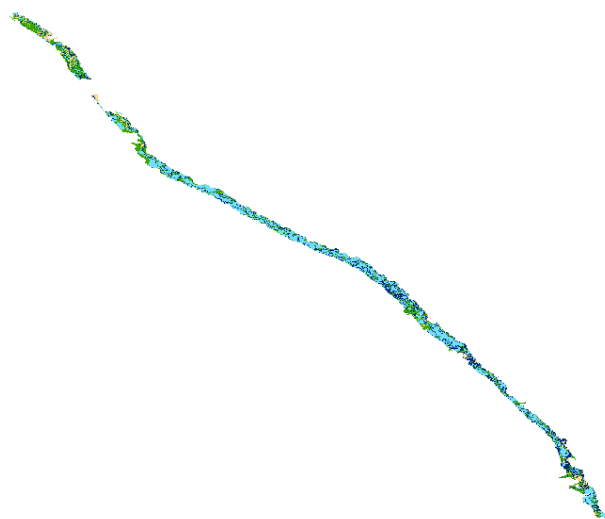
234

235

Table S49. Confusion Matrix with commission and omission errors from late-May to July 1998

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	55	3	2	0	60	0.08	87.5%	0.83
Marsh	1	55	0	4	60	0.08		
Wet meadow	2	4	50	4	60	0.17		
Woody/Shrub	1	4	5	50	60	0.17		
Marginal total	59	66	57	58	240			
Omission Error	0.07	0.17	0.12	0.14				

236



237

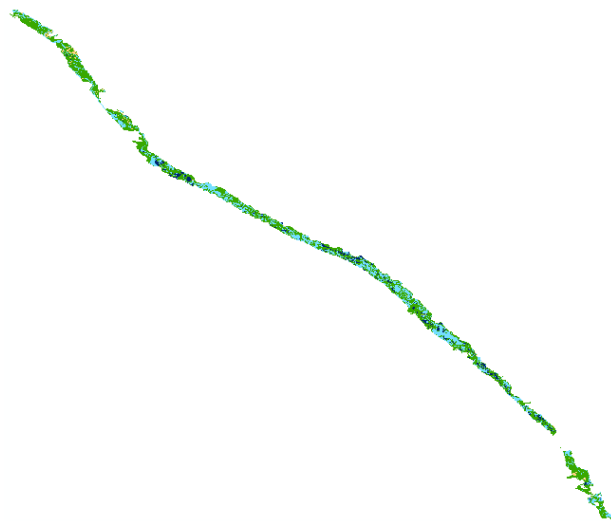
238

239

Table S50. Confusion Matrix with commission and omission errors from late-May to July 2001

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	52	4	4	0	60	0.13	86.7%	0.82
Marsh	1	51	3	5	60	0.15		
Wet meadow	0	3	53	4	60	0.12		
Woody/Shrub	0	3	5	52	60	0.13		
Marginal total	53	61	65	61	240			
Omission Error	0.02	0.16	0.18	0.15				

240



241

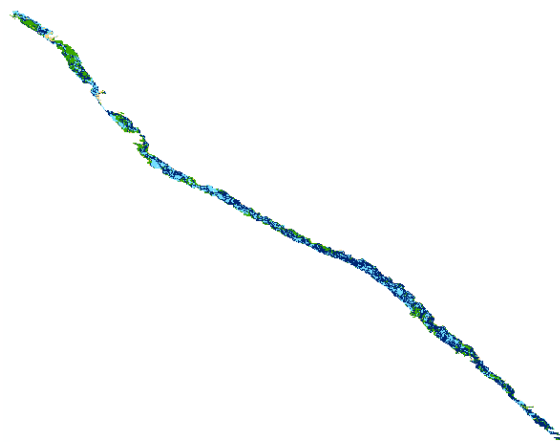
242

243

Table S51. Confusion Matrix with commission and omission errors from late-May to July 2002

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	56	3	1	0	60	0.07	89.6%	0.86
Marsh	1	55	0	4	60	0.08		
Wet meadow	0	3	54	3	60	0.10		
Woody/Shrub	0	4	6	50	60	0.17		
Marginal total	57	65	61	57	240			
Omission Error	0.02	0.15	0.11	0.12				

244



245

246

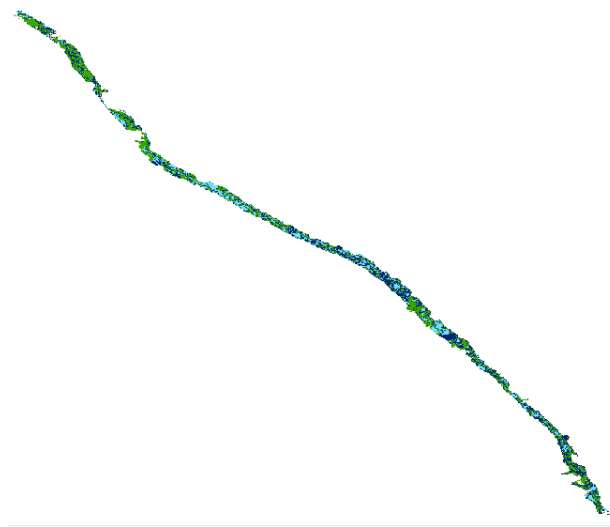
247

248

Table S52. Confusion Matrix with commission and omission errors from late-May to July 2004

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	57	1	2	0	60	0.05	91.3%	0.88
Marsh	1	55	0	4	60	0.08		
Wet meadow	0	3	54	3	60	0.10		
Woody/Shrub	0	3	4	53	60	0.12		
Marginal total	58	62	60	60	240			
Omission Error	0.02	0.11	0.10	0.12				

249



250

251

252

Table S53. Confusion Matrix with commission and omission errors from late-May to July 2005

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	89	2	9	0	100	0.11	87.0%	0.83
Marsh	6	84	10	0	100	0.16		
Wet meadow	3	7	85	5	100	0.15		
Woody/Shrub	0	6	4	90	100	0.10		
Marginal total	98	99	108	95	400			
Omission Error	0.09	0.15	0.21	0.05				

253

254

255

256

Table S54. Confusion Matrix with commission and omission errors from late-May to July 2006

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	58	1	1	0	60	0.03	91.7%	0.89
Marsh	1	55	0	4	60	0.08		
Wet meadow	0	2	54	4	60	0.10		
Woody/Shrub	0	4	3	53	60	0.12		
Marginal total	59	62	58	61	240			
Omission Error	0.02	0.11	0.07	0.13				

257

258

259

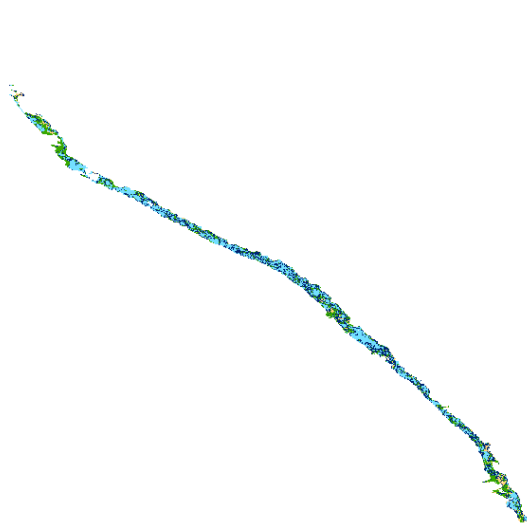
260

261

Table S55. Confusion Matrix with commission and omission errors from late-May to July 2009

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	91	4	5	0	100	0.09		
Marsh	5	86	5	4	100	0.14		
Wet meadow	3	5	86	6	100	0.14	87.8%	0.84
Woody/Shrub	0	1	11	88	100	0.12		
Marginal total	99	96	107	98	400			
Omission Error	0.08	0.10	0.20	0.10				

262



263

264

265

Table S56. Confusion Matrix with commission and omission errors from late-May to July 2010

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	54	2	4	0	60	0.10		
Marsh	1	55	0	4	60	0.08		
Wet meadow	0	3	53	4	60	0.12	89.6%	0.86
Woody/Shrub	0	4	3	53	60	0.12		
Marginal total	55	64	60	61	240			
Omission Error	0.02	0.14	0.12	0.13				

266

267

268

269

Table S57. Confusion Matrix with commission and omission errors from late-May to July 2013

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	54	5	1	0	60	0.10	90.8%	0.88
Marsh	1	54	0	5	60	0.10		
Wet meadow	0	3	55	2	60	0.08		
Woody/Shrub	0	2	3	55	60	0.08		
Marginal total	55	64	59	62	240			
Omission Error	0.02	0.16	0.07	0.11				

270

271

272

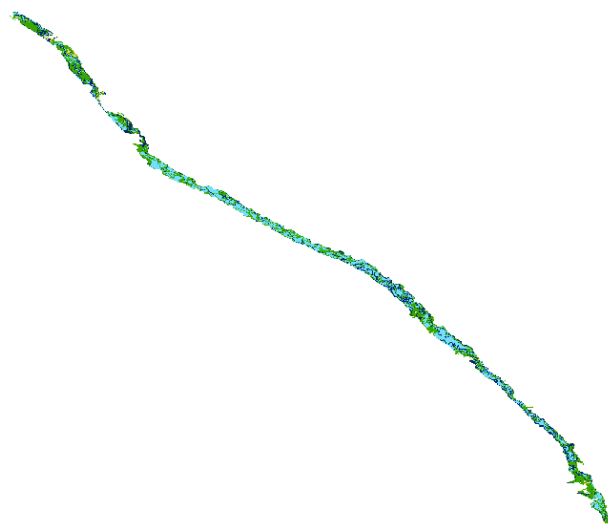
273

274

Table S58. Confusion Matrix with commission and omission errors from late-May to July 2014

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	56	1	3	0	60	0.07	89.6%	0.86
Marsh	1	53	3	3	60	0.12		
Wet meadow	0	4	53	3	60	0.12		
Woody/Shrub	0	3	4	53	60	0.12		
Marginal total	57	61	63	59	240			
Omission Error	0.02	0.13	0.16	0.10				

275



276

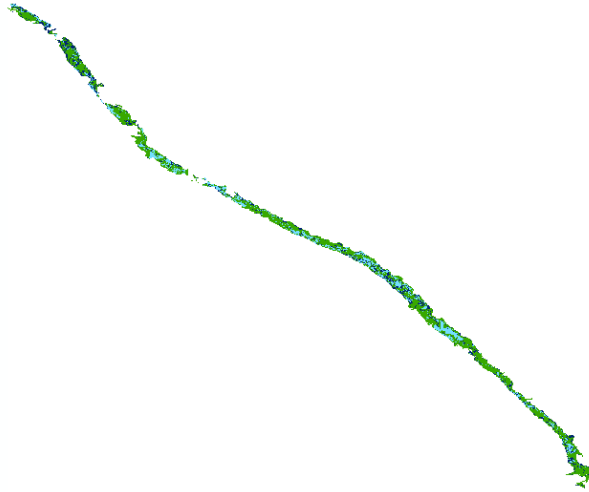
277

278

Table S59. Confusion Matrix with commission and omission errors from late-May to July 2015

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	55	1	4	0	60	0.08	90.4%	0.87
Marsh	1	55	0	4	60	0.08		
Wet meadow	0	4	53	3	60	0.12		
Woody/Shrub	0	5	1	54	60	0.10		
Marginal total	56	65	58	61	240			
Omission Error	0.02	0.15	0.09	0.11				

279



280

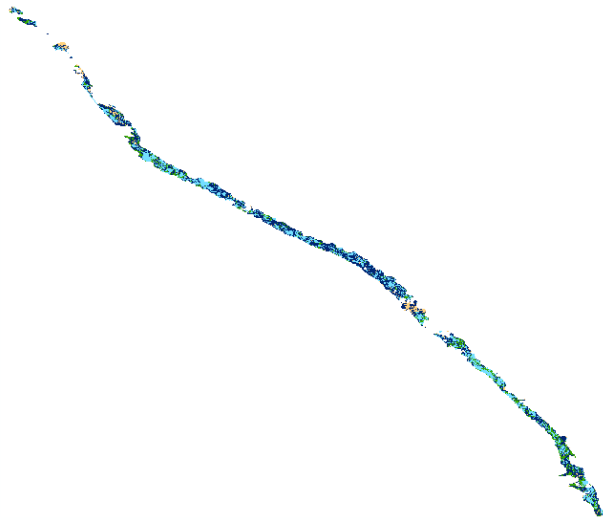
281

282

Table S60. Confusion Matrix with commission and omission errors from late-May to July 2016

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	90	5	5	0	100	0.10	89.0%	0.85
Marsh	5	88	7	0	100	0.12		
Wet meadow	5	4	87	4	100	0.13		
Woody/Shrub	0	5	4	91	100	0.09		
Marginal total	100	102	103	95	400			
Omission Error	0.10	0.14	0.16	0.04				

283



284

285

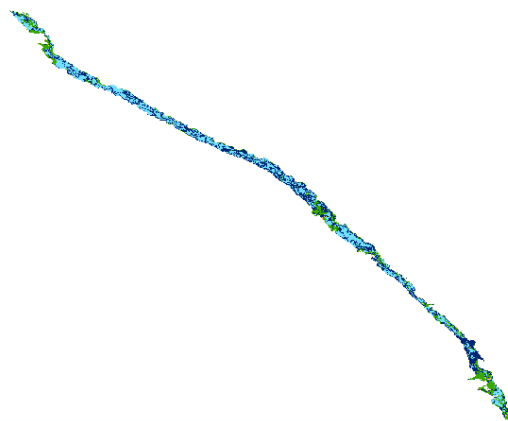
286

287

Table S61. Confusion Matrix with commission and omission errors from late-May to July 2017

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	92	4	4	0	100	0.08		
Marsh	5	86	9	0	100	0.14		
Wet meadow	5	5	88	2	100	0.12	88.8%	0.85
Woody/Shrub	0	5	6	89	100	0.11		
Marginal total	102	100	107	91	400			
Omission Error	0.10	0.14	0.18	0.02				

288



289

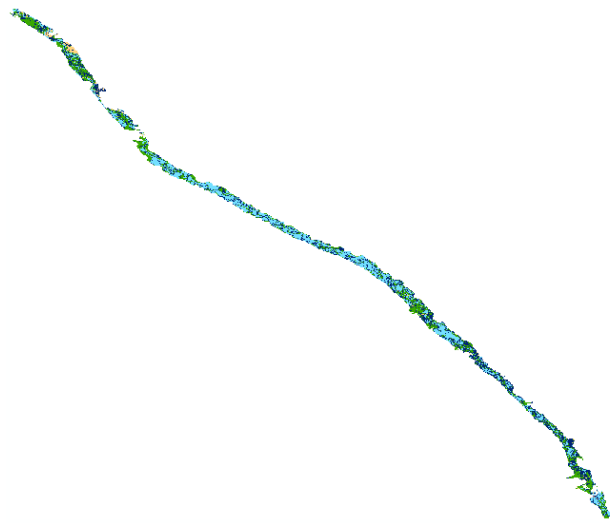
290

291

Table S62. Confusion Matrix with commission and omission errors from late-May to July 2018

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	93	3	4	0	100	0.07		
Marsh	4	88	8	0	100	0.12		
Wet meadow	4	4	89	3	100	0.11	90.0%	0.87
Woody/Shrub	0	4	6	90	100	0.10		
Marginal total	101	99	107	93	400			
Omission Error	0.08	0.11	0.17	0.03				

292



293

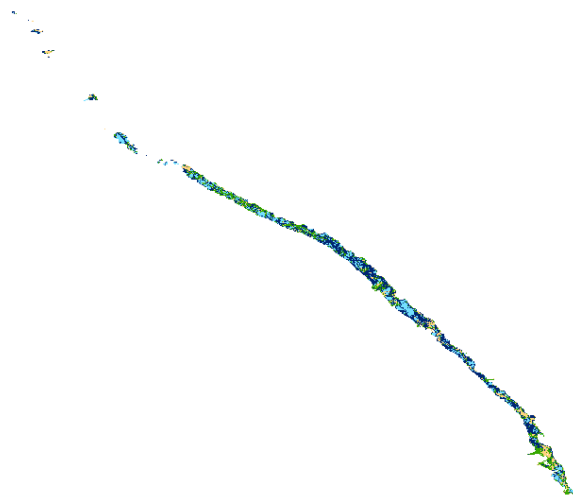
294

295

Table S63. Confusion Matrix with commission and omission errors from late-May to July 2019

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	91	4	5	0	100	0.09	90.0%	0.87
Marsh	2	88	10	0	100	0.12		
Wet meadow	4	4	89	3	100	0.11		
Woody/Shrub	0	3	5	92	100	0.08		
Marginal total	97	99	109	95	400			
Omission Error	0.06	0.11	0.18	0.03				

296



297

298

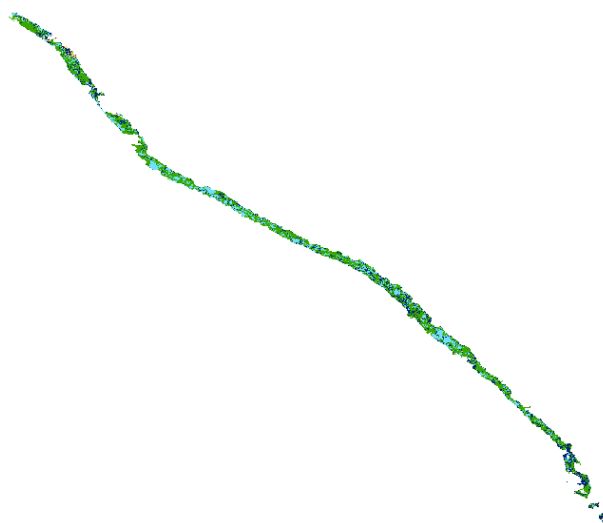
299

300

Table S64. Confusion Matrix with commission and omission errors from late-May to July 2020

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	90	1	9	0	100	0.10	87.0%	0.83
Marsh	8	85	7	0	100	0.15		
Wet meadow	5	5	86	4	100	0.14		
Woody/Shrub	0	4	9	87	100	0.13		
Marginal total	103	95	111	91	400			
Omission Error	0.13	0.11	0.23	0.04				

301



302

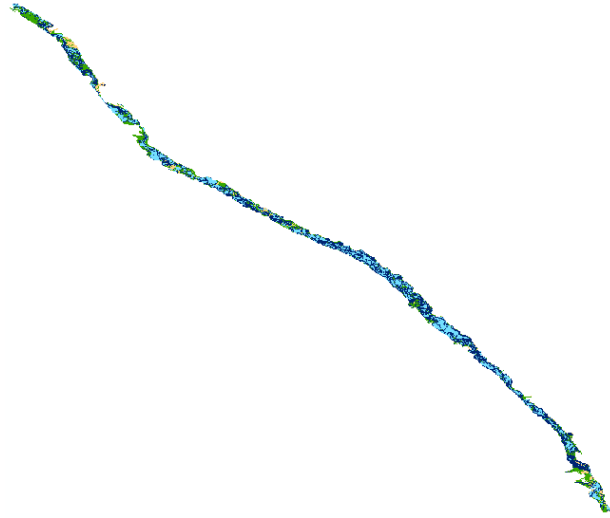
303

304

Table S65. Confusion Matrix with commission and omission errors from late-May to July 2021

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	92	4	4	0	100	0.08	88.8%	0.85
Marsh	8	86	6	0	100	0.14		
Wet meadow	1	6	89	4	100	0.11		
Woody/Shrub	0	5	7	88	100	0.12		
Marginal total	101	101	106	92	400			
Omission Error	0.09	0.15	0.16	0.04				

305



306

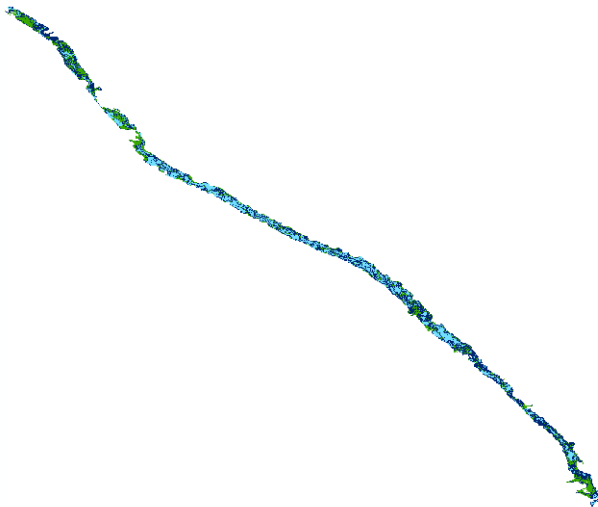
307

308

Table S66. Confusion Matrix with commission and omission errors from late-May to July 2022

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	91	3	6	0	100	0.09	90.3%	0.87
Marsh	4	90	6	0	100	0.10		
Wet meadow	3	2	89	6	100	0.11		
Woody/Shrub	0	4	5	91	100	0.09		
Marginal total	98	99	106	97	400			
Omission Error	0.07	0.09	0.16	0.06				

309



310

311

312

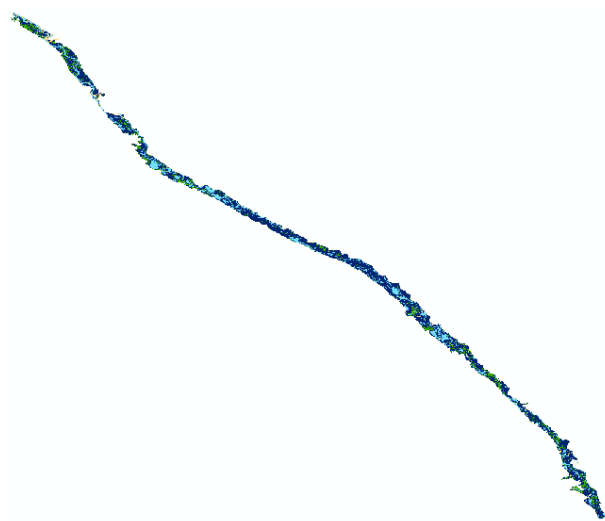
313 **2.3. Season: August to mid-September**

314

315 **Table S67.** Confusion Matrix with commission and omission errors from August to mid-September 1984

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	84	10	6	0	100	0.16	81.8%	0.76
Marsh	0	82	12	6	100	0.18		
Wet meadow	0	12	80	8	100	0.20		
Woody/Shrub	0	7	12	81	100	0.19		
Marginal total	84	111	110	95	400			
Omission Error	0	0.26	0.27	0.15				

316



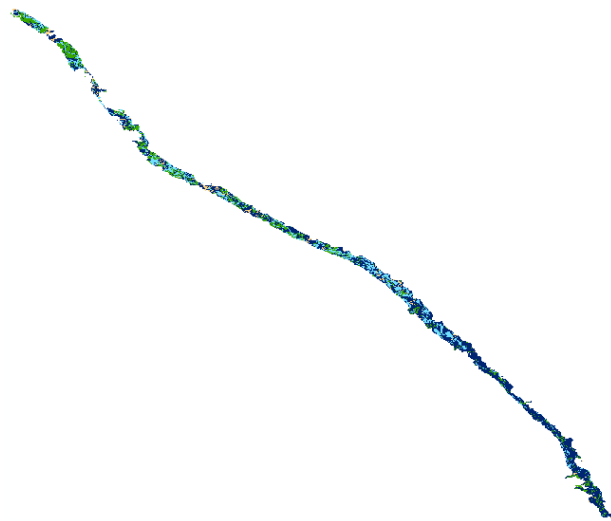
317

318

319 **Table S68.** Confusion Matrix with commission and omission errors from August to mid-September 1985

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	85	9	6	0	100	0.15	84.5%	0.79
Marsh	0	84	10	6	100	0.16		
Wet meadow	0	11	85	4	100	0.15		
Woody/Shrub	0	6	10	84	100	0.16		
Marginal total	85	110	111	94	400			
Omission Error	0	0.236	0.23	0.11				

320



321

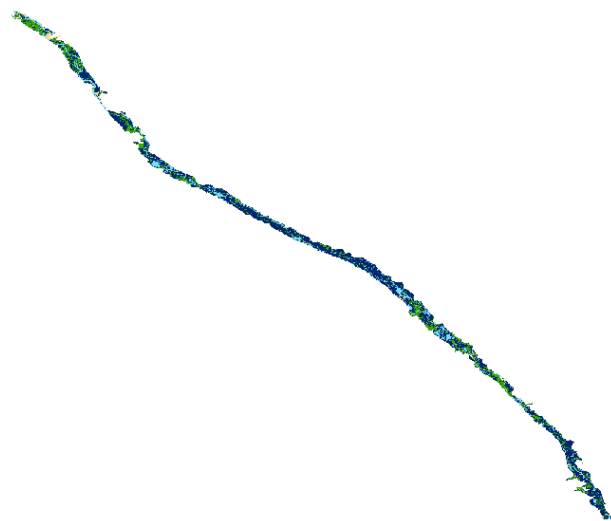
322

323

Table S69. Confusion Matrix with commission and omission errors from August to mid-September 1986

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	86	3	5	0	94	0.09		
Marsh	0	85	12	3	100	0.15		
Wet meadow	0	11	84	5	100	0.16	86.3%	0.82
Woody/Shrub	0	4	11	85	100	0.15		
Marginal total	86	103	112	93	394			
Omission Error	0	0.175	0.25	0.09				

324



325

326

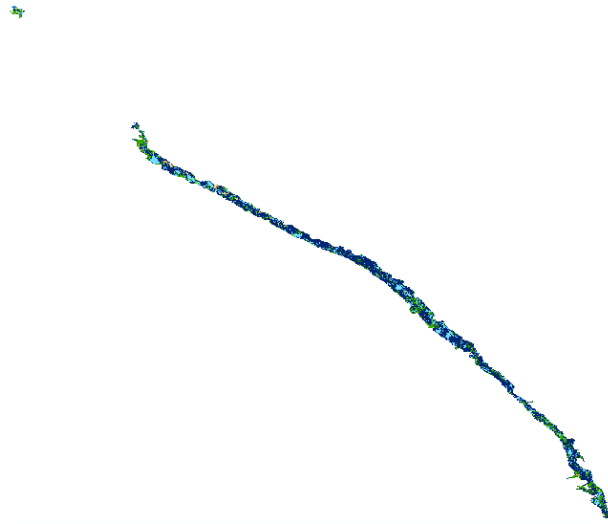
327

328

Table S70. Confusion Matrix with commission and omission errors from August to mid-September 1987

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	87	9	4	0	100	0.13	85.0%	0.80
Marsh	6	84	10	0	100	0.16		
Wet meadow	0	12	83	5	100	0.17		
Woody/Shrub	0	8	6	86	100	0.14		
Marginal total	93	113	103	91	400			
Omission Error	0.06	0.26	0.19	0.05				

329



330

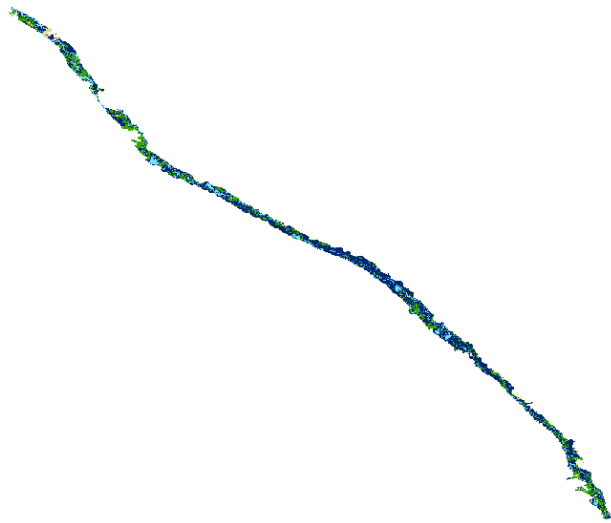
331

332

Table S71. Confusion Matrix with commission and omission errors from August to mid-September 1988

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	86	8	4	0	98	0.12	82.7%	0.77
Marsh	0	80	15	5	100	0.20		
Wet meadow	0	6	83	11	100	0.17		
Woody/Shrub	0	12	8	80	100	0.20		
Marginal total	86	106	110	96	398			
Omission Error	0	0.25	0.25	0.17				

333



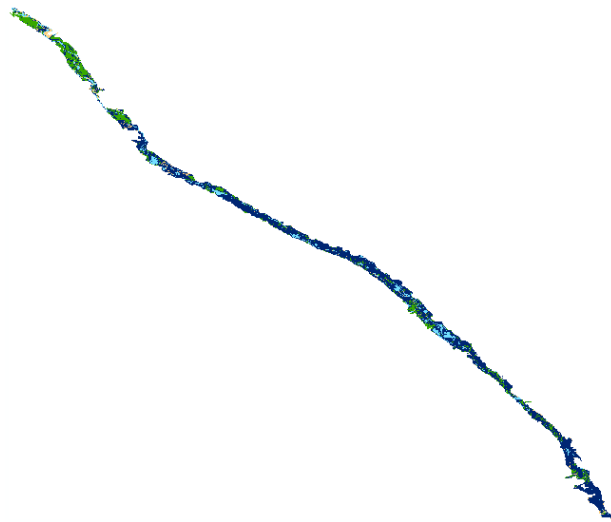
334

335

336 **Table S72.** Confusion Matrix with commission and omission errors from August to mid-September 1990

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	80	12	8	0	100	0.20		
Marsh	6	79	5	10	100	0.21		
Wet meadow	4	11	77	8	100	0.23	79.3%	0.72
Woody/Shrub	0	10	9	81	100	0.19		
Marginal total	90	112	99	99	400			
Omission Error	0.11	0.29	0.22	0.18				

337



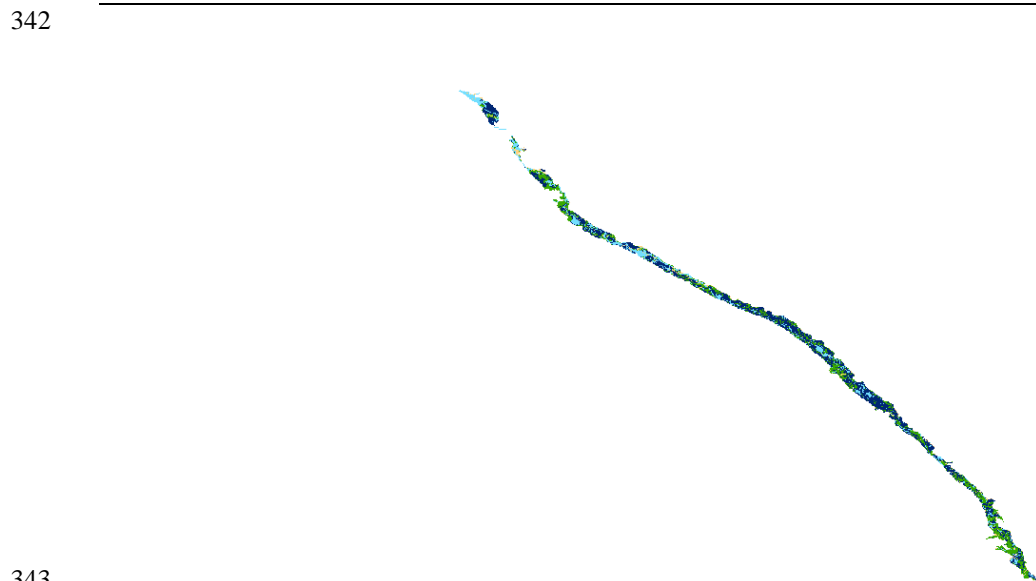
338

339

340

341 **Table S73.** Confusion Matrix with commission and omission errors from August to mid-September 1991

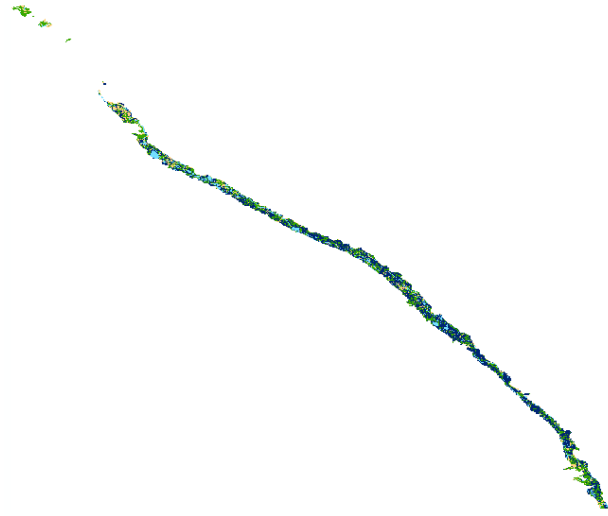
Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	83	8	9	0	100	0.17	83.5%	0.78
Marsh	6	82	6	6	100	0.18		
Wet meadow	4	9	84	3	100	0.16		
Woody/Shrub	0	9	6	85	100	0.15		
Marginal total	93	108	105	94	400			
Omission Error	0.11	0.24	0.20	0.10				



343
344
345 **Table S74.** Confusion Matrix with commission and omission errors from August to mid-September 1993

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	54	2	4	0	60	0.10	90.4%	0.87
Marsh	1	54	0	5	60	0.10		
Wet meadow	0	4	55	1	60	0.08		
Woody/Shrub	0	1	5	54	60	0.10		
Marginal total	55	61	64	60	240			
Omission Error	0.02	0.11	0.14	0.10				

346



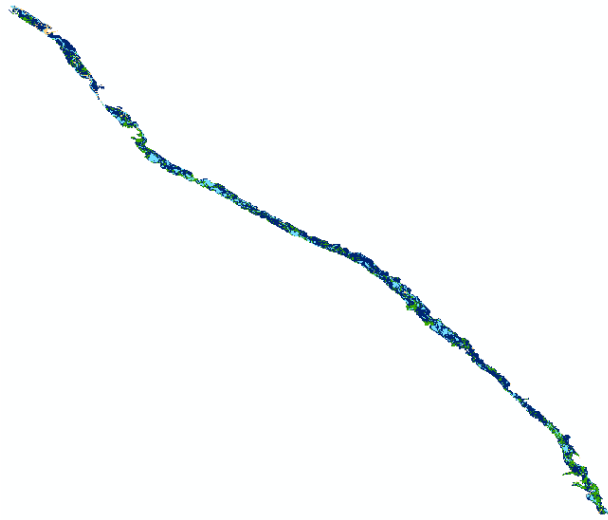
347

348

349 **Table S75.** Confusion Matrix with commission and omission errors from August to mid-September 1994

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	56	1	3	0	60	0.07	90.0%	0.87
Marsh	1	54	0	5	60	0.10		
Wet meadow	0	3	53	4	60	0.12		
Woody/Shrub	0	4	3	53	60	0.12		
Marginal total	57	62	59	62	240			
Omission Error	0.02	0.13	0.10	0.15				

350



351

352

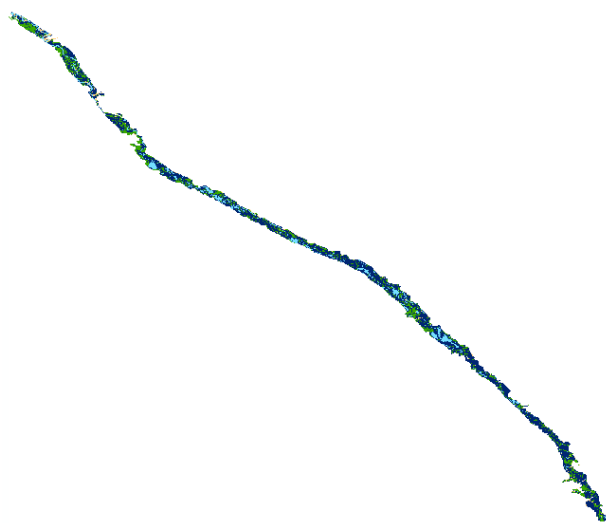
353

354

Table S76. Confusion Matrix with commission and omission errors from August to mid-September 1996

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	50	5	5	0	60	0.17	86.3%	0.82
Marsh	1	53	0	6	60	0.12		
Wet meadow	0	4	53	3	60	0.12		
Woody/Shrub	0	4	5	51	60	0.15		
Marginal total	51	66	63	60	240			
Omission Error	0.02	0.20	0.16	0.15				

355



356

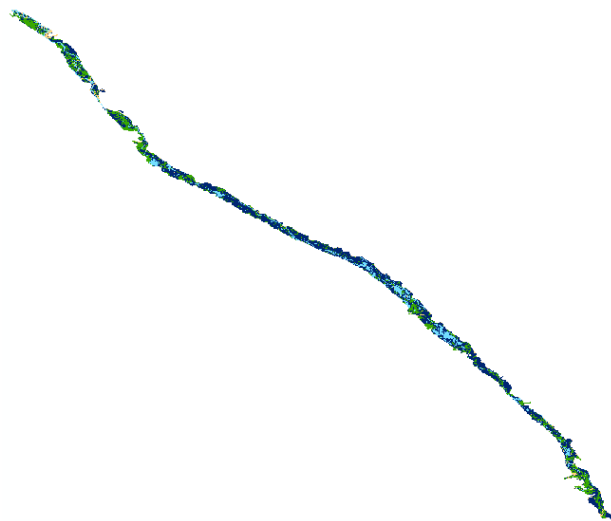
357

358

Table S77. Confusion Matrix with commission and omission errors from August to mid-September 1997

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	56	1	3	0	60	0.07	90.4%	0.87
Marsh	1	55	0	4	60	0.08		
Wet meadow	0	3	53	4	60	0.12		
Woody/Shrub	0	4	3	53	60	0.12		
Marginal total	57	63	59	61	240			
Omission Error	0.02	0.13	0.10	0.13				

359



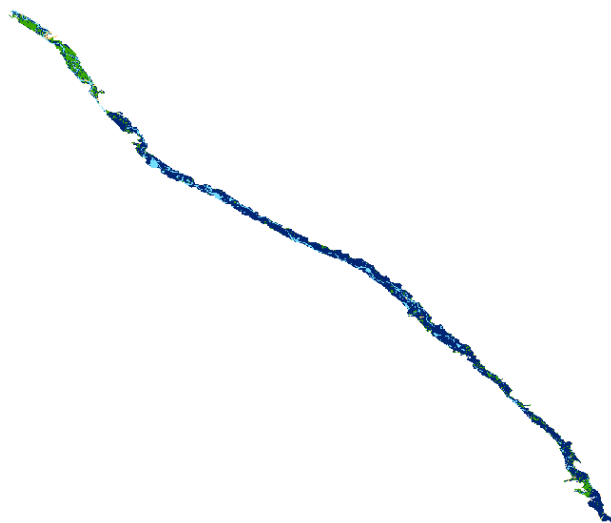
360

361

362 **Table S78.** Confusion Matrix with commission and omission errors from August to mid-September 1998

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	53	2	5	0	60	0.12	88.8%	0.85
Marsh	1	54	0	5	60	0.10		
Wet meadow	0	4	55	1	60	0.08		
Woody/Shrub	0	4	5	51	60	0.15		
Marginal total	54	64	65	57	240			
Omission Error	0.02	0.16	0.15	0.11				

363



364

365

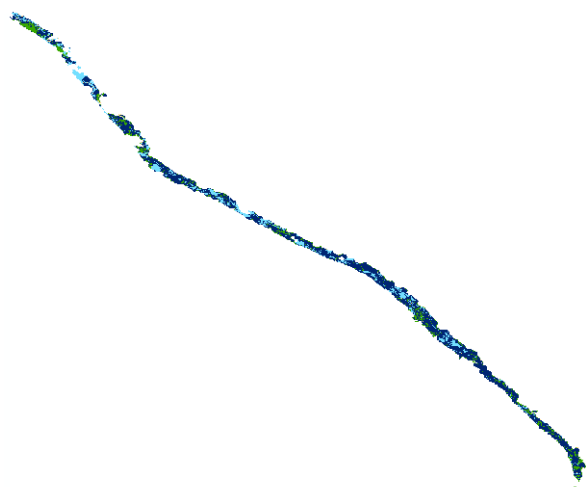
366

367

Table S79. Confusion Matrix with commission and omission errors from August to mid-September 2000

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	53	3	4	0	60	0.12	87.9%	0.84
Marsh	1	56	0	3	60	0.07		
Wet meadow	0	4	52	4	60	0.13		
Woody/Shrub	0	4	6	50	60	0.17		
Marginal total	54	67	62	57	240			
Omission Error	0.02	0.16	0.16	0.12				

368



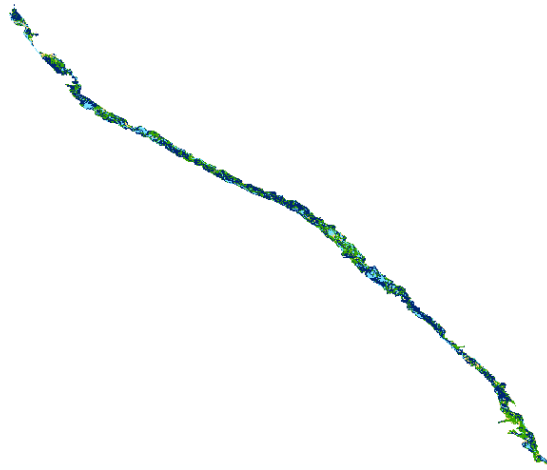
369

370

Table S80. Confusion Matrix with commission and omission errors from August to mid-September 2001

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	52	7	1	0	60	0.13	86.3%	0.82
Marsh	1	55	1	3	60	0.08		
Wet meadow	0	4	50	6	60	0.17		
Woody/Shrub	1	4	5	50	60	0.17		
Marginal total	54	70	57	59	240			
Omission Error	0.04	0.21	0.12	0.15				

372



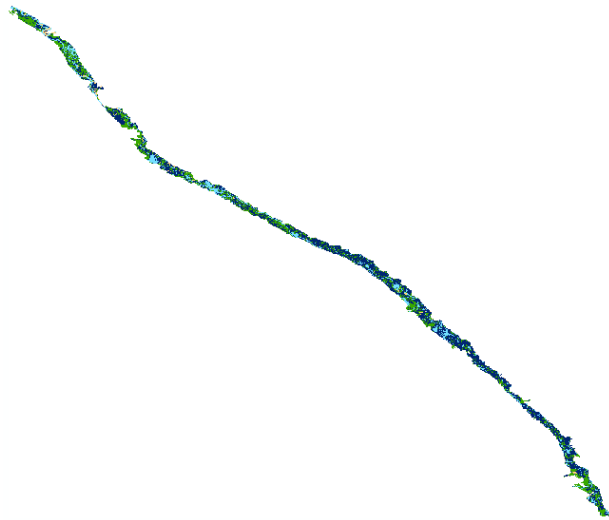
373

374

375 **Table S81.** Confusion Matrix with commission and omission errors from August to mid-September 2002

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	53	3	4	0	60	0.12		
Marsh	1	53	1	5	60	0.12		
Wet meadow	0	4	55	1	60	0.08	90.0%	0.87
Woody/Shrub	0	4	1	55	60	0.08		
Marginal total	54	64	61	61	240			
Omission Error	0.02	0.17	0.10	0.10				

376



377

378

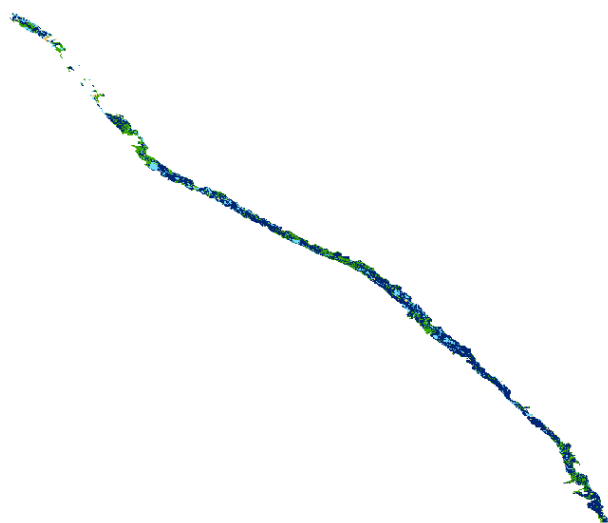
379

380

Table S82. Confusion Matrix with commission and omission errors from August to mid-September 2003

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	57	1	2	0	60	0.05	88.3%	0.84
Marsh	0	54	0	6	60	0.10		
Wet meadow	0	5	50	5	60	0.17		
Woody/Shrub	0	4	5	51	60	0.15		
Marginal total	57	64	57	62	240			
Omission Error	0.00	0.16	0.12	0.18				

381



382

383

384

Table S83. Confusion Matrix with commission and omission errors from August to mid-September 2004

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	54	5	1	0	60	0.10	88.8%	0.85
Marsh	1	53	0	6	60	0.12		
Wet meadow	0	4	52	4	60	0.13		
Woody/Shrub	0	4	2	54	60	0.10		
Marginal total	55	66	55	64	240			
Omission Error	0.02	0.20	0.05	0.16				

385

386

387

388

Table S84. Confusion Matrix with commission and omission errors from August to mid-September 2005

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	81	11	8	0	100	0.19		
Marsh	9	82	9	0	100	0.18		
Wet meadow	4	8	82	6	100	0.18	82.3%	0.76
Woody/Shrub	0	10	6	84	100	0.16		
Marginal total	94	111	105	90	400			
Omission Error	0.14	0.26	0.22	0.07				

389

390

391

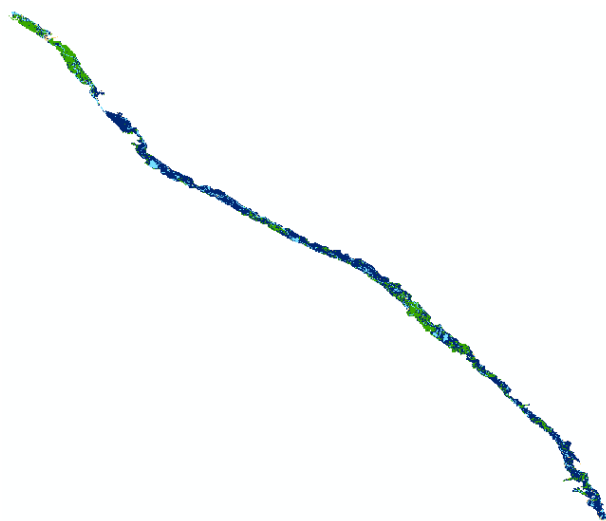
392

393

Table S85. Confusion Matrix with commission and omission errors from August to mid-September 2006

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	54	4	2	0	60	0.10	90.4%	0.87
Marsh	1	54	0	5	60	0.10		
Wet meadow	0	2	54	4	60	0.10		
Woody/Shrub	0	4	1	55	60	0.08		
Marginal total	55	64	57	64	240			
Omission Error	0.02	0.16	0.05	0.14				

394



395

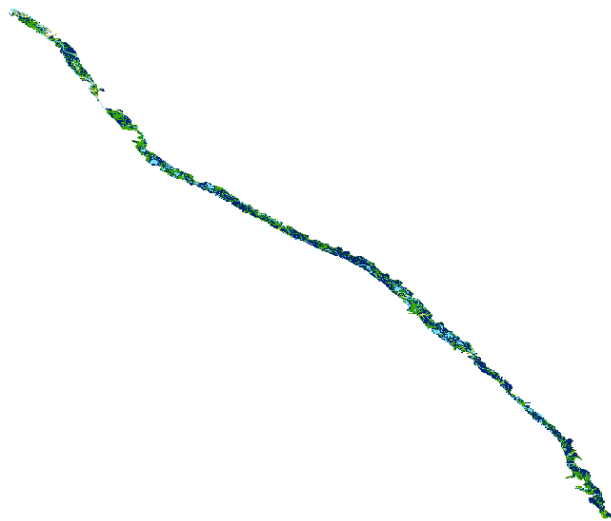
396

397

Table S86. Confusion Matrix with commission and omission errors from August to mid-September 2007

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	84	10	6	0	100	0.16	83.5%	0.78
Marsh	4	83	4	9	100	0.17		
Wet meadow	1	8	85	6	100	0.15		
Woody/Shrub	0	10	8	82	100	0.18		
Marginal total	89	111	103	97	400			
Omission Error	0.06	0.25	0.17	0.15				

398



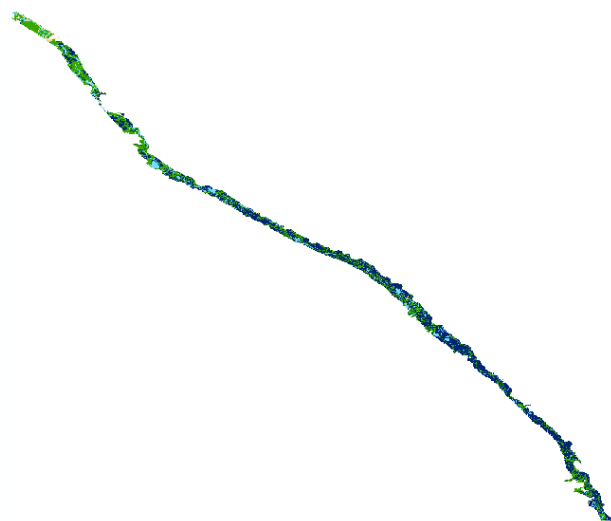
399

400

401 **Table S87.** Confusion Matrix with commission and omission errors from August to mid-September 2008

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	53	3	4	0	60	0.12	88.8%	0.85
Marsh	1	54	0	5	60	0.10		
Wet meadow	0	5	53	2	60	0.12		
Woody/Shrub	0	6	1	53	60	0.12		
Marginal total	54	68	58	60	240			
Omission Error	0.02	0.21	0.09	0.12				

402



403

404

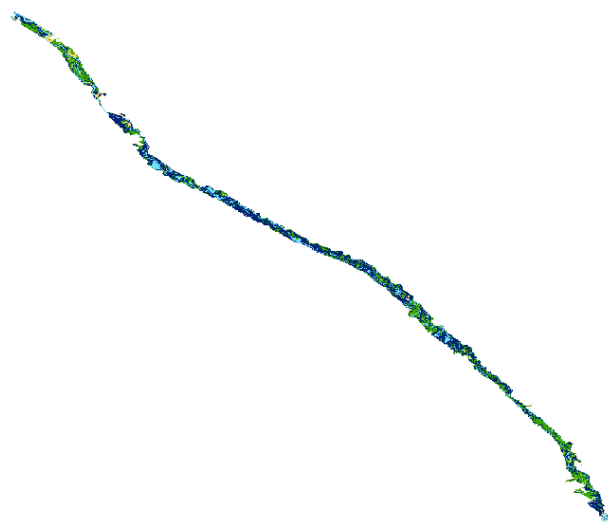
405

406

Table S88. Confusion Matrix with commission and omission errors from August to mid-September 2009

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	86	5	9	0	100	0.14		
Marsh	2	81	11	6	100	0.19		
Wet meadow	4	6	80	10	100	0.20	82.8%	0.77
Woody/Shrub	0	4	12	84	100	0.16		
Marginal total	92	96	112	100	400			
Omission Error	0.07	0.16	0.29	0.16				

407



408

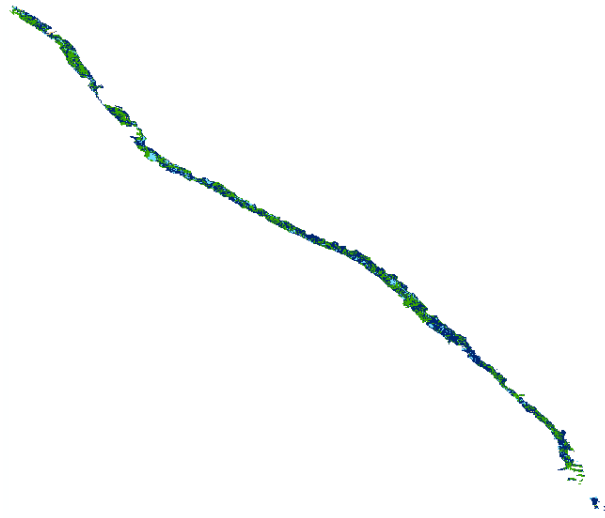
409

410

Table S89. Confusion Matrix with commission and omission errors from August to mid-September 2010

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	56	2	2	0	60	0.07		
Marsh	1	55	0	4	60	0.08		
Wet meadow	0	4	52	4	60	0.13	89.6%	0.86
Woody/Shrub	0	4	4	52	60	0.13		
Marginal total	57	65	58	60	240			
Omission Error	0.02	0.15	0.10	0.13				

411



412

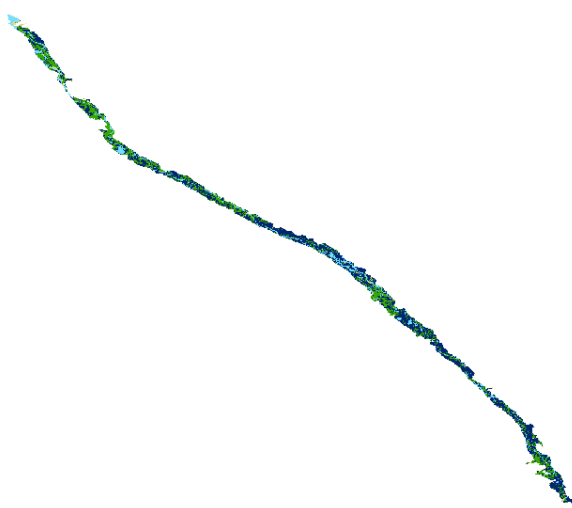
413

414

Table S90. Confusion Matrix with commission and omission errors from August to mid-September 2011

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	53	3	4	0	60	0.12	87.9%	0.84
Marsh	1	53	0	6	60	0.12		
Wet meadow	0	4	52	4	60	0.13		
Woody/Shrub	0	4	3	53	60	0.12		
Marginal total	54	64	59	63	240			
Omission Error	0.02	0.17	0.12	0.16				

415



416

417

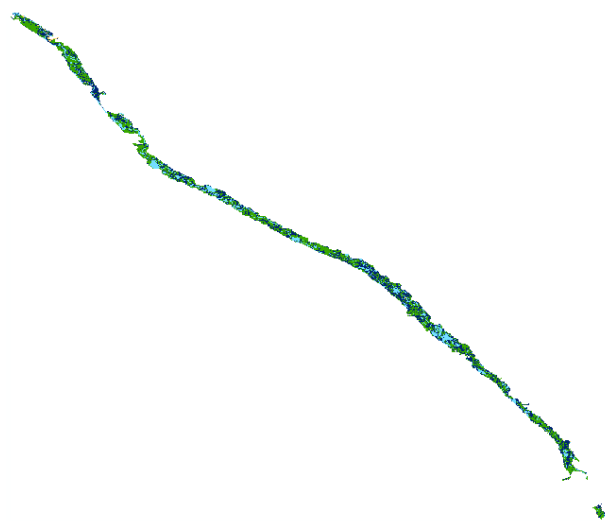
418

419

Table S91. Confusion Matrix with commission and omission errors from August to mid-September 2013

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	52	5	3	0	60	0.13	88.8%	0.85
Marsh	1	55	1	3	60	0.08		
Wet meadow	0	4	50	6	60	0.17		
Woody/Shrub	0	3	1	56	60	0.07		
Marginal total	53	67	55	65	240			
Omission Error	0.02	0.18	0.09	0.14				

420



421

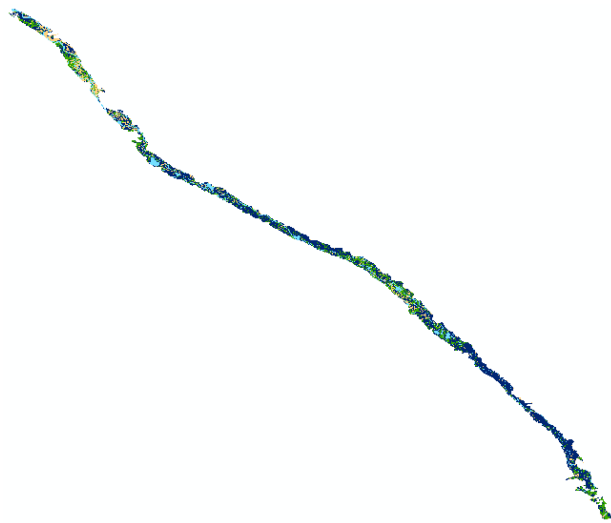
422

423

Table S92. Confusion Matrix with commission and omission errors from August to mid-September 2014

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	54	5	1	0	60	0.10	88.8%	0.85
Marsh	1	54	0	5	60	0.10		
Wet meadow	0	3	53	4	60	0.12		
Woody/Shrub	0	3	5	52	60	0.13		
Marginal total	55	65	59	61	240			
Omission Error	0.02	0.17	0.10	0.15				

424



425

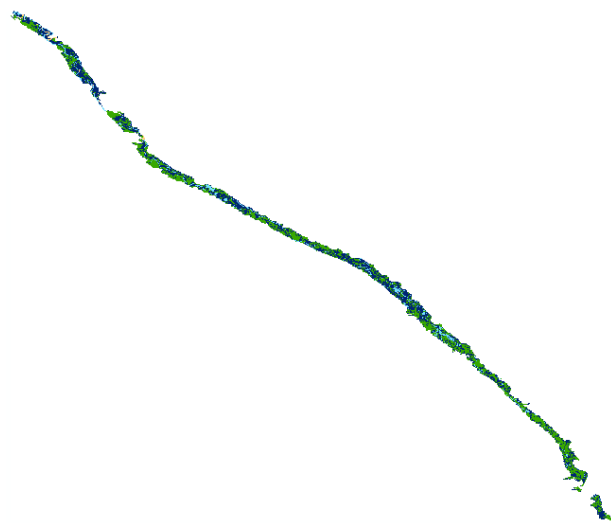
426

427

Table S93. Confusion Matrix with commission and omission errors from August to mid-September 2015

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	52	4	4	0	60	0.13	86.3%	0.82
Marsh	2	53	0	5	60	0.12		
Wet meadow	0	3	51	6	60	0.15		
Woody/Shrub	0	4	5	51	60	0.15		
Marginal total	54	64	60	62	240			
Omission Error	0.04	0.17	0.15	0.18				

428



429

430

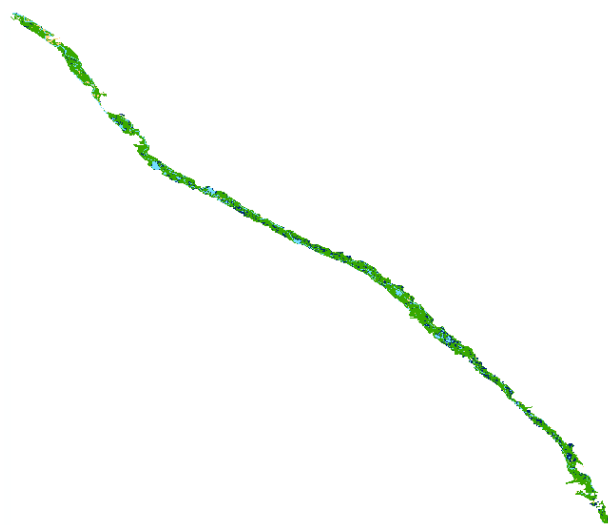
431

432

Table S94. Confusion Matrix with commission and omission errors from August to mid-September 2016

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	80	9	11	0	100	0.20	80.5%	0.74
Marsh	8	82	10	0	100	0.18		
Wet meadow	4	8	81	7	100	0.19		
Woody/Shrub	0	9	12	79	100	0.21		
Marginal total	92	108	114	86	400			
Omission Error	0.13	0.24	0.29	0.08				

433



434

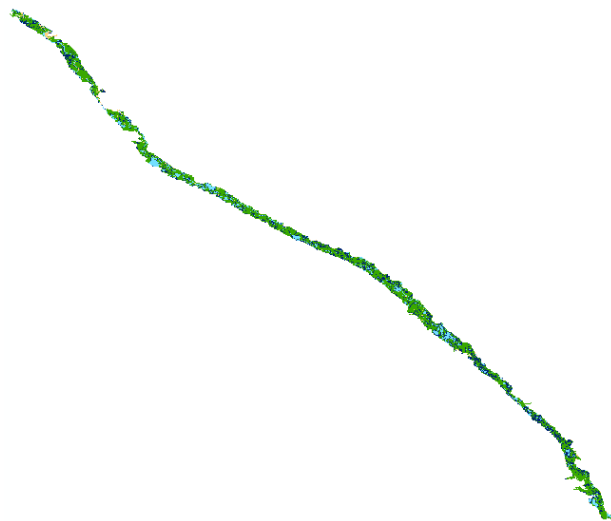
435

436

Table S95. Confusion Matrix with commission and omission errors from August to mid-September 2017

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	83	10	7	0	100	0.17	83.8%	0.78
Marsh	5	81	14	0	100	0.19		
Wet meadow	5	7	85	3	100	0.15		
Woody/Shrub	0	4	10	86	100	0.14		
Marginal total	93	102	116	89	400			
Omission Error	0.11	0.21	0.27	0.03				

437



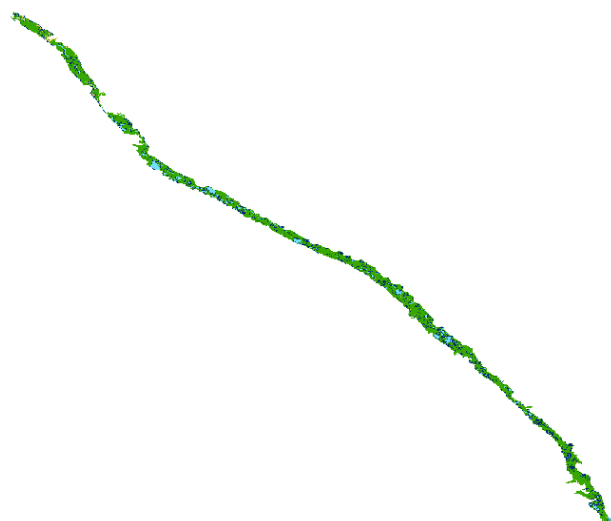
438

439

440 **Table S96.** Confusion Matrix with commission and omission errors from August to mid-September 2018

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	81	5	14	0	100	0.19		
Marsh	5	83	10	2	100	0.17		
Wet meadow	5	7	85	3	100	0.15	83.3%	0.78
Woody/Shrub	0	5	11	84	100	0.16		
Marginal total	91	100	120	89	400			
Omission Error	0.11	0.17	0.29	0.06				

441



442

443

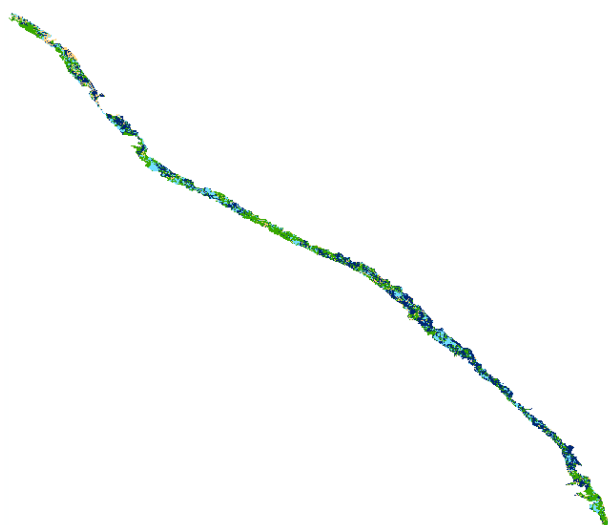
444

445

Table S97. Confusion Matrix with commission and omission errors from August to mid-September 2019

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	80	9	11	0	100	0.20	81.5%	0.75
Marsh	4	81	10	5	100	0.19		
Wet meadow	6	7	81	6	100	0.19		
Woody/Shrub	0	8	8	84	100	0.16		
Marginal total	90	105	110	95	400			
Omission Error	0.11	0.23	0.26	0.12				

446



447

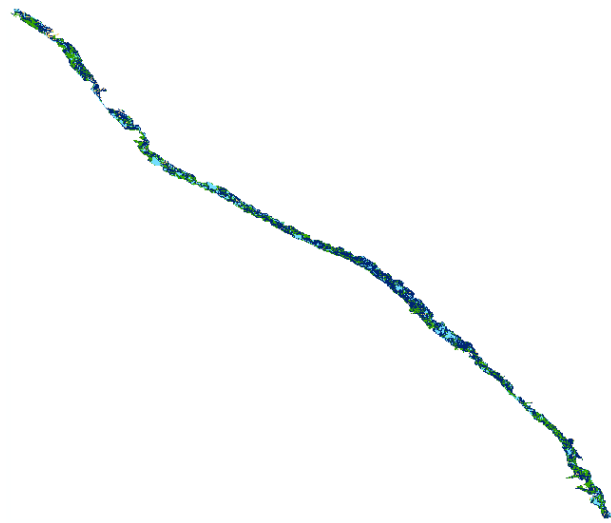
448

449

Table S98. Confusion Matrix with commission and omission errors from August to mid-September 2020

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	84	7	9	0	100	0.16	85.0%	0.80
Marsh	6	85	9	0	100	0.15		
Wet meadow	5	8	85	2	100	0.15		
Woody/Shrub	0	7	7	86	100	0.14		
Marginal total	95	107	110	88	400			
Omission Error	0.12	0.21	0.23	0.02				

450



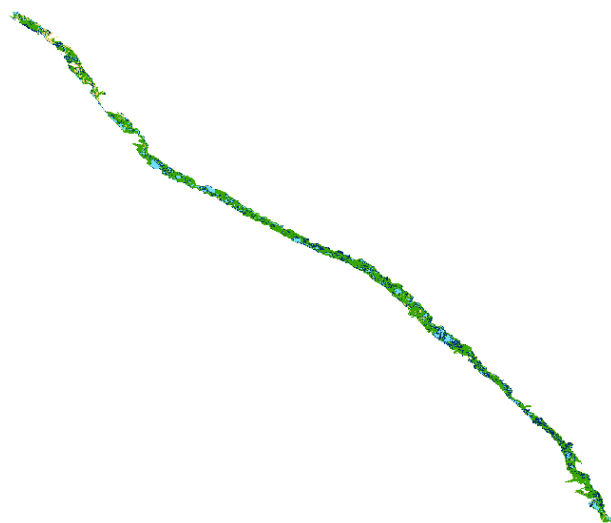
451

452

453 **Table S99.** Confusion Matrix with commission and omission errors from August to mid-September 2021

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	81	9	10	0	100	0.19		
Marsh	6	82	12	0	100	0.18		
Wet meadow	3	5	84	8	100	0.16	82.0%	0.76
Woody/Shrub	0	9	10	81	100	0.19		
Marginal total	90	105	116	89	400			
Omission Error	0.10	0.22	0.28	0.09				

454



455

456

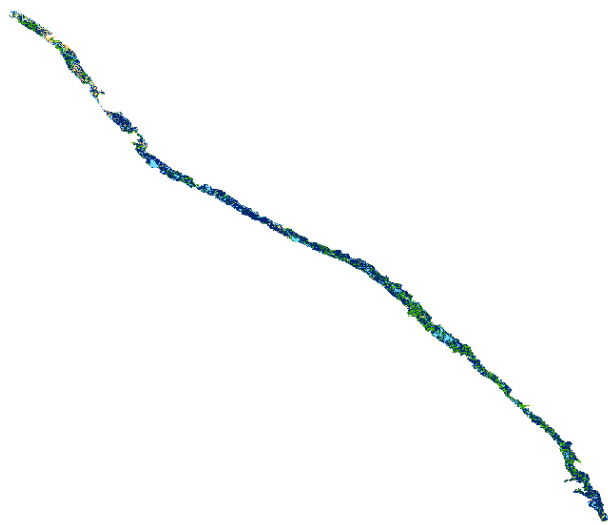
457

458

Table S100. Confusion Matrix with commission and omission errors from August to mid-September 2022

Classes	Water	Marsh	Wet meadow	Woody/Shrub	Marginal total	Comission Error	Total Accuracy	Kappa Index
Water	81	9	10	0	100	0.19		
Marsh	8	82	10	0	100	0.18		
Wet meadow	3	5	84	8	100	0.16	82.0%	0.76
Woody/Shrub	0	3	16	81	100	0.19		
Marginal total	92	99	120	89	400			
Omission Error	0.12	0.17	0.30	0.09				

459



460

461

462

463

464

465

466

467

468

469

470

471 **3. Location and type of change**

472 **Table S101.** Main land use changed locations in 39 years (1984 - 2022) between Invermere and Brisco.

Variable	Invermere to Brisco		
	Latitude	Longitude	Type of Change
April to mid-May	-116.070038	50.584393	Marsh -> Woody
	-116.095173	50.603175	Increasing Woody
	-116.04308	50.528733	Marsh -> Woody
	-116.177899	50.736033	Increasing Woody
	-116.239655	50.78855	Marsh -> Wet meadow
	-116.125143	50.670709	Marsh -> Wet meadow
	-116.174606	50.713339	Marsh -> Woody
	-116.081219	50.574385	Increasing Woody
	-116.277338	50.811556	Marsh -> Wet meadow
	-116.162224	50.703786	Marsh -> Wet meadow
Peak flow	-116.038112	50.526231	Marsh -> Woody
	-116.093436	50.606662	Marsh -> Woody
	-116.090273	50.63334	Marsh -> Woody
	-116.11979	50.670035	Marsh -> Open Water
	-116.14746	50.698404	Open Water -> Marsh
	-116.198786	50.738707	Marsh -> Woody
	-116.19326	50.738995	Marsh -> Wet meadow
	-116.221557	50.765768	Open Water -> Wet meadow
	-116.24932	50.788413	Open Water -> Wet meadow
	-116.27364	50.812031	Marsh -> Wet meadow
August to mid-September	-116.038535	50.521344	Open Water -> Wet meadow
	-116.064085	50.550234	Increasing Woody
	-116.092762	50.60131	Increasing Woody
	-116.104538	50.633638	Increasing Woody
	-116.130242	50.67333	Marsh -> Woody
	-116.171825	50.710084	Marsh -> Woody
	-116.217978	50.759342	Open Water -> Marsh
	-116.237113	50.781734	Marsh -> Woody
	-116.25554	50.794001	Marsh -> Woody
-116.290514	50.822827	Open Water -> Marsh	

473
474
475
476

477 **Table S102.** Main land use changed locations in 39 years (1984 - 2022) between Brisco and Spillimacheen.

Variable	Brisco - Spillimacheen		
	Latitude	Longitude	Type of Change
April to mid-May	-116.296517	50.840185	Marsh -> Wet meadow
	-116.359798	50.877271	Marsh -> Woody
	-116.322492	50.848615	Open Water -> Wet meadow
	-116.334955	50.860212	Open Water -> Marsh
	-116.319927	50.837705	Marsh -> Woody
	-116.350209	50.874409	Marsh -> Open Water
	-116.344624	50.885097	Marsh -> Open Water
	-116.371156	50.882477	Marsh -> Wet meadow
	-116.296917	50.846019	Marsh -> Wet meadow
	-116.319993	50.860906	Open Water -> Wet meadow
Peak flow	-116.289817	50.830419	Marsh -> Wet meadow
	-116.297046	50.830983	Marsh -> Woody
	-116.294508	50.838653	Marsh -> Wet meadow
	-116.320395	50.83832	Increasing Woody
	-116.313122	50.847201	Increase Open Water
	-116.324668	50.86354	Increasing Woody
	-116.327038	50.855792	Increasing Open Water
	-116.355121	50.877561	Open Water -> Marsh
	-116.368778	50.886045	Open Water -> Marsh
	-116.370496	50.881495	Increasing of Woody
August to mid-September	-116.29541	50.834518	Increase of Woody
	-116.293753	50.837741	Marsh -> Wet meadow
	-116.293775	50.842699	Marsh -> Wet meadow
	-116.31053	50.846637	Open water -> Wet meadow
	-116.305856	50.840886	Open water -> Wet meadow
	-116.333778	50.860109	Marsh -> Open water
	-116.32318	50.853831	Marsh -> Woody
	-116.35226	50.86656	Open Water -> Marsh
	-116.325442	50.864001	Increasing Woody
	-116.376093	50.886876	Reduction Open Water

478
 479
 480
 481
 482
 483
 484
 485

Table S103. Main land use changed locations in 39 years (1984 - 2022) between Spillimacheen and Golden

Variable	Spillimacheen - Golden		
	Latitude	Longitude	Type of Change
April to mid-May	-116.381517	50.904509	Open Water -> Wet meadow
	-116.426604	50.947291	Open Water -> Wet meadow
	-116.507493	51.003967	Marsh -> Woody
	-116.607194	51.047293	Reduction Open Water
	-116.680141	51.080912	Open Water -> Wet meadow
	-116.729989	51.113138	Reduction Open Water
	-116.753706	51.123268	Marsh -> Woody
	-116.786234	51.140634	Open Water -> Wet meadow
	-116.839237	51.158389	Marsh -> Wet meadow
	-116.962987	51.275513	Reduction Open Water
Peak flow	-116.381174	50.904655	Reduction Open Water
	-116.382784	50.921354	Open Water -> Marsh
	-116.432436	50.942758	Marsh -> Open Water
	-116.5587	51.030912	Marsh -> Woody
	-116.631734	51.055287	Marsh -> Woody
	-116.704028	51.091648	Open Water -> Wet meadow
	-116.807933	51.150807	Increasing of Woody
	-116.832644	51.157964	Marsh -> Wet meadow
	-116.903095	51.223405	Increasing Woody
-116.931728	51.264756	Open Water -> Marsh	
August to mid-September	-116.368994	50.900224	Marsh -> Woody
	-116.400081	50.915843	Increasing Woody
	-116.437284	50.958089	Increasing Woody
	-116.474132	50.989651	Open Water -> Wet meadow
	-116.560292	51.029483	Increasing Woody
	-116.613644	51.054003	Marsh -> Woody
	-116.676204	51.080471	Open Water -> Wet meadow
	-116.821183	51.152432	Marsh -> Woody
	-116.865949	51.184354	Increasing Woody
-116.933324	51.263125	Open Water -> Marsh	

487

488

489

490

491

492

493

494

Table S104. Main land use changed locations in 39 years (1984 - 2022) between Golden and Donald

Variable	Golden - Donald		
	Latitude	Longitude	Type of Change
April to mid-May	-116.992146	51.320568	Increasing Woody
	-117.01136	51.345238	Open Water -> Wet meadow
	-117.014935	51.360769	Increasing Woody
	-117.055091	51.402087	Marsh -> Woody
	-117.040339	51.397867	Open Water -> Marsh
	-117.073468	51.424158	Increasing Woody
	-117.083538	51.435288	Open Water -> Wet meadow
	-117.10259	51.450278	Open Water -> Wet meadow
	-117.113668	51.456344	Open Water -> Wet meadow
	-117.125409	51.448876	Open Water -> Wet meadow
Peak flow	-116.981377	51.32178	Marsh -> Wet meadow
	-116.995945	51.326782	Marsh -> Open Water
	-117.006986	51.348752	Increasing Woody
	-117.015061	51.348185	Marsh -> Woody
	-117.016769	51.361068	Open Water -> Marsh
	-117.047576	51.387613	Open Water -> Marsh
	-117.084054	51.429086	Increasing Woody
	-117.102849	51.436973	Open Water -> Wet meadow
	-117.088435	51.436425	Open Water -> Wet meadow
	-117.117431	51.448929	Increasing Woody
August to mid-September	-116.992433	51.321521	Increasing Woody
	-117.000772	51.338861	Open Water -> Wet meadow
	-117.040707	51.397238	Marsh -> Wet meadow
	-117.067665	51.415269	Open Water -> Marsh
	-117.090323	51.43747	Open Water -> Wet meadow
	-117.112821	51.455289	Open Water -> Wet meadow
	-117.146128	51.46369	Increasing Woody
	-117.12988	51.455909	Increasing Woody
	-117.093061	51.441884	Increasing Woody
-117.087133	51.426688	Increasing Woody	