

## Supplement C

### Error matrices for the annual crop type classifications for the Rur catchment (2008-2011 & 2013-2015)

#### Abbreviations:

p = pixels  
 % = percent  
 OA = Overall accuracy  
 PA = Producer's accuracy  
 UA = User's accuracy  
 OE = Omission Error  
 CE = Commission Error  
 Kappa = Kappa

Table 1. Error matrix for the final crop type classification of the Rur catchment for 2008

		reference data (pixels)									
crop class		winter rapeseed	potato	maize	sugar beet	winter wheat	winter barley	spring barley	Total	CE (%)	UA (%)
Classification (p)	winter rapeseed	3422	0	0	0	0	0	0	3422	0.00	100.00
	potato	0	4163	0	371	0	0	0	4534	8.18	91.82
	maize	0	2	3230	75	0	0	16	3323	2.80	97.20
	sugar beet	0	539	96	11206	7	0	0	11848	5.42	94.58
	winter wheat	11	0	0	0	11642	1246	124	13023	10.60	89.40
	winter barley	210	0	0	0	977	8046	0	9233	12.86	87.14
	spring barley	0	0	84	0	0	0	2368	2452	3.43	96.57
	<b>Total</b>	<b>3643</b>	<b>4704</b>	<b>3410</b>	<b>11652</b>	<b>12626</b>	<b>9292</b>	<b>2508</b>	<b>47835</b>	-	-
<b>OE (%)</b>	<b>6.07</b>	<b>11.50</b>	<b>5.28</b>	<b>3.83</b>	<b>7.79</b>	<b>13.41</b>	<b>5.58</b>	-	<b>OA (%)</b>	<b>92.14</b>	
<b>PA (%)</b>	<b>93.93</b>	<b>88.50</b>	<b>94.72</b>	<b>96.17</b>	<b>92.21</b>	<b>86.59</b>	<b>94.42</b>	-	<b>Kappa</b>	<b>0.90</b>	

Reference of the full land use classification with corresponding metadata:

Waldhoff, G., 2012. Enhanced Land Use Classification of 2008 for the Rur catchment. CRC/TR32 Database (TR32DB), DOI: 10.5880/TR32DB.1.

Table 2. Error matrix for the final crop type classification of the Rur catchment for 2009

		reference data (pixels)									
crop class		winter rapeseed	potato	maize	sugar beet	winter wheat	winter barley	spring barley	Total	CE (%)	UA (%)
Classification (p)	winter rapeseed	6561	6	1	0	4	27	2	6601	0,61	99,39
	potato	0	1183	0	0	0	0	0	1183	0,00	100,00
	maize	0	0	6384	0	0	0	0	6384	0,00	100,00
	sugar beet	0	2558	111	12114	0	0	0	14783	18,05	81,95
	winter wheat	0	0	0	0	14057	2537	1	16595	15,29	84,71
	winter barley	0	55	0	0	288	7184	235	7762	7,45	92,55
	spring barley	8	0	20	0	35	18	3169	3250	2,49	97,51
	<b>Total</b>	<b>6569</b>	<b>3802</b>	<b>6516</b>	<b>12114</b>	<b>14384</b>	<b>9766</b>	<b>3407</b>	<b>56558</b>	-	-
<b>OE (%)</b>	<b>0,12</b>	<b>68,88</b>	<b>2,03</b>	<b>0,00</b>	<b>2,27</b>	<b>26,44</b>	<b>6,99</b>	-	<b>OA (%)</b>	<b>89,56</b>	
<b>PA (%)</b>	<b>99,88</b>	<b>31,12</b>	<b>97,97</b>	<b>100</b>	<b>97,73</b>	<b>73,56</b>	<b>93,01</b>	-	<b>Kappa</b>	<b>0,87</b>	

Reference of the full land use classification with corresponding metadata:

Waldhoff, G., 2012. Enhanced Land Use Classification of 2009 for the Rur catchment. CRC/TR32 Database (TR32DB), DOI: 10.5880/TR32DB.2.

Table 3. Error matrix for the final crop type classification of the Rur catchment for 2010

		reference data (pixels)									
crop class		winter rapeseed	potato	maize	sugar beet	winter wheat	winter barley	spring barley	Total	CE (%)	UA (%)
Classification (p)	winter rapeseed	7486	0	0	0	0	0	5	7491	0.07	99.93
	potato	0	6907	3	147	0	0	0	7057	2.13	97.87
	maize	8	6	8315	228	46	0	127	8730	4.75	95.25
	sugar beet	0	2187	212	18080	0	0	2	20481	11.72	88.28
	winter wheat	0	81	0	0	16382	1499	52	18014	9.06	90.94
	winter barley	7	5	0	0	651	6342	154	7159	11.41	88.59
	spring barley	0	0	0	0	140	0	4004	4144	3.38	96.62
	<b>Total</b>	<b>7501</b>	<b>9186</b>	<b>8530</b>	<b>18455</b>	<b>17219</b>	<b>7841</b>	<b>4344</b>	<b>73076</b>	-	-
<b>OE (%)</b>	<b>0.20</b>	<b>24.81</b>	<b>2.52</b>	<b>2.03</b>	<b>4.86</b>	<b>19.12</b>	<b>7.83</b>	-	<b>OA (%)</b>	<b>92.39</b>	
<b>PA (%)</b>	<b>99.80</b>	<b>75.19</b>	<b>97.48</b>	<b>97.97</b>	<b>95.14</b>	<b>80.88</b>	<b>92.17</b>	-	<b>Kappa</b>	<b>0.91</b>	

Reference of the full land use classification with corresponding metadata:

Waldhoff, G., 2012. Enhanced Land Use Classification of 2010 for the Rur catchment. CRC/TR32 Database (TR32DB), DOI: 10.5880/TR32DB.3.

Table 4. Error matrix for the final crop type classification of the Rur catchment for 2011

		reference data (pixels)									
crop class		winter rapeseed	potato	maize	sugar beet	winter wheat	winter barley	spring barley	Total	CE (%)	UA (%)
Classification (p)	winter rapeseed	4166	10	0	75	11	533	126	4921	15.34	84.66
	potato	0	2471	39	183	0	0	0	2693	8.24	91.76
	maize	0	408	2656	63	0	0	11	3138	15.36	84.64
	sugar beet	0	4067	180	13473	102	66	0	17888	24.68	75.32
	winter wheat	63	164	0	294	27032	1772	19	29344	7.88	92.12
	winter barley	157	56	0	0	251	3709	2	4175	11.16	88.84
	spring barley	116	0	0	0	468	0	2303	2887	20.23	79.77
	<b>Total</b>	<b>4502</b>	<b>7176</b>	<b>2875</b>	<b>14088</b>	<b>27864</b>	<b>6080</b>	<b>2461</b>	<b>65046</b>	-	-
<b>OE (%)</b>	<b>7.46</b>	<b>65.57</b>	<b>7.62</b>	<b>4.37</b>	<b>2.99</b>	<b>39.00</b>	<b>6.42</b>	-	<b>OA (%)</b>	<b>85.80</b>	
<b>PA (%)</b>	<b>92.54</b>	<b>34.43</b>	<b>92.38</b>	<b>95.63</b>	<b>97.01</b>	<b>61.00</b>	<b>93.58</b>	-	<b>Kappa</b>	<b>0.80</b>	

Reference of the full land use classification with corresponding metadata:

Lussem, U., Waldhoff, G., 2013. Enhanced land use classification of 2011 for the Rur catchment, DOI: 10.5880/TR32DB.7.

Table 5. Error matrix for the final crop type classification of the Rur catchment for 2013

		reference data (pixels)									
crop class		winter rapeseed	potato	maize	sugar beet	winter wheat	winter barley	spring barley	Total	CE (%)	UA (%)
Classification (p)	winter rapeseed	5807	5	0	0	0	9	12	5833	0.45	99.55
	potato	0	692	3	300	0	0	0	995	30.45	69.55
	maize	3	69	1752	409	0	1	0	2234	21.58	78.42
	sugar beet	1	202	108	7720	2	1	0	8034	3.91	96.09
	winter wheat	28	4	10	4	8001	3076	360	11483	30.32	69.68
	winter barley	0	0	0	0	557	2583	46	3186	18.93	81.07
	spring barley	27	0	7	0	0	6	1605	1645	2.43	97.57
	<b>Total</b>	<b>5866</b>	<b>972</b>	<b>1880</b>	<b>8433</b>	<b>8560</b>	<b>5676</b>	<b>2023</b>	<b>33410</b>	-	-
<b>OE (%)</b>	<b>1.01</b>	<b>28.81</b>	<b>6.81</b>	<b>8.45</b>	<b>6.53</b>	<b>54.49</b>	<b>20.66</b>	-	<b>OA (%)</b>	<b>84.29</b>	
<b>PA (%)</b>	<b>98.99</b>	<b>71.19</b>	<b>93.19</b>	<b>91.55</b>	<b>93.47</b>	<b>45.51</b>	<b>79.34</b>	-	<b>Kappa</b>	<b>0.80</b>	

Reference of the full land use classification with corresponding metadata:

Lussem, U., Waldhoff, G., 2014. Enhanced land use classification 2013 of the Rur catchment. CRC/TR32 Database (TR32DB), DOI: 10.5880/TR32DB.11.

Table 6. Error matrix for the final crop type classification of the Rur catchment for 2014

		reference data (pixels)									
crop class		winter rapeseed	potato	maize	sugar beet	winter wheat	winter barley	spring barley	Total	CE (%)	UA (%)
Classification (p)	winter rapeseed	8924	76	0	89	20	90	0	9199	2.99	97.01
	potato	9	8987	80	412	44	4	0	9536	5.76	94.24
	maize	2	254	8430	1074	0	19	2	9781	13.81	86.19
	sugar beet	75	91	648	29329	579	17	0	30739	4.59	95.41
	winter wheat	3	1	0	2	39664	2942	1494	44106	10.07	89.93
	winter barley	8	1	0	3	1310	9018	45	10385	13.16	86.84
	spring barley	0	0	0	0	132	0	2480	2612	5.05	94.95
	<b>Total</b>	<b>9021</b>	<b>9410</b>	<b>9158</b>	<b>30909</b>	<b>41749</b>	<b>12090</b>	<b>4021</b>	<b>116358</b>	-	-
<b>OE (%)</b>	<b>1.08</b>	<b>4.50</b>	<b>7.95</b>	<b>5.11</b>	<b>4.99</b>	<b>25.41</b>	<b>38.32</b>	-	<b>OA (%)</b>	<b>91.81</b>	
<b>PA (%)</b>	<b>98.92</b>	<b>95.50</b>	<b>92.05</b>	<b>94.89</b>	<b>95.01</b>	<b>74.59</b>	<b>61.68</b>	-	<b>Kappa</b>	<b>0.89</b>	

Reference of the full land use classification with corresponding metadata:

Lussem, U., Waldhoff, G., 2015. Enhanced land use classification 2014 of the Rur catchment - Update. CRC/TR32 Database (TR32DB), DOI: 10.5880/TR32DB.13.

Table 7. Error matrix for the final crop type classification of the Rur catchment for 2015

		reference data (pixels)									
crop class		winter rapeseed	potato	maize	sugar beet	winter wheat	winter barley	spring barley	Total	CE (%)	UA (%)
Classification (p)	winter rapeseed	4931	0	0	0	0	0	1	4932	0.02	99.98
	potato	0	3856	0	192	0	0	5	4053	4.86	95.14
	maize	0	0	3210	38	2	0	6	3256	1.41	98.59
	sugar beet	2	104	0	6373	0	0	0	6479	1.64	98.36
	winter wheat	0	0	0	0	12576	189	143	12908	2.57	97.43
	winter barley	58	26	0	22	174	4407	60	4747	7.16	92.84
	spring barley	22	0	0	0	0	0	4157	4179	0.53	99.47
	<b>Total</b>	<b>5013</b>	<b>3986</b>	<b>3210</b>	<b>6625</b>	<b>12752</b>	<b>4596</b>	<b>4372</b>	<b>40554</b>	-	-
<b>OE (%)</b>	<b>1.64</b>	<b>3.26</b>	<b>0.00</b>	<b>3.80</b>	<b>1.38</b>	<b>4.11</b>	<b>4.92</b>	-	<b>OA (%)</b>	<b>97.43</b>	
<b>PA (%)</b>	<b>98.36</b>	<b>96.74</b>	<b>100.00</b>	<b>96.20</b>	<b>98.62</b>	<b>95.89</b>	<b>95.08</b>	-	<b>Kappa</b>	<b>0.97</b>	

Reference of the full land use classification with corresponding metadata:

Waldhoff, G., Lussem, U., 2016. Enhanced land use classification 2015 of the Rur catchment - Update. CRC/TR32 Database (TR32DB), DOI: 10.5880/TR32DB.19.