

EVALUATION OF THE VEGETATION STRUCTURE AND PRODUCTIVITY OF WETLAND ECOSYSTEMS USING SATELLITE DATA

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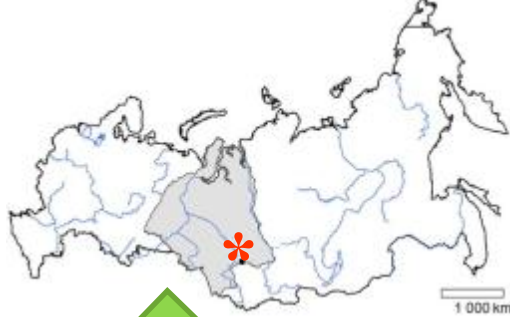
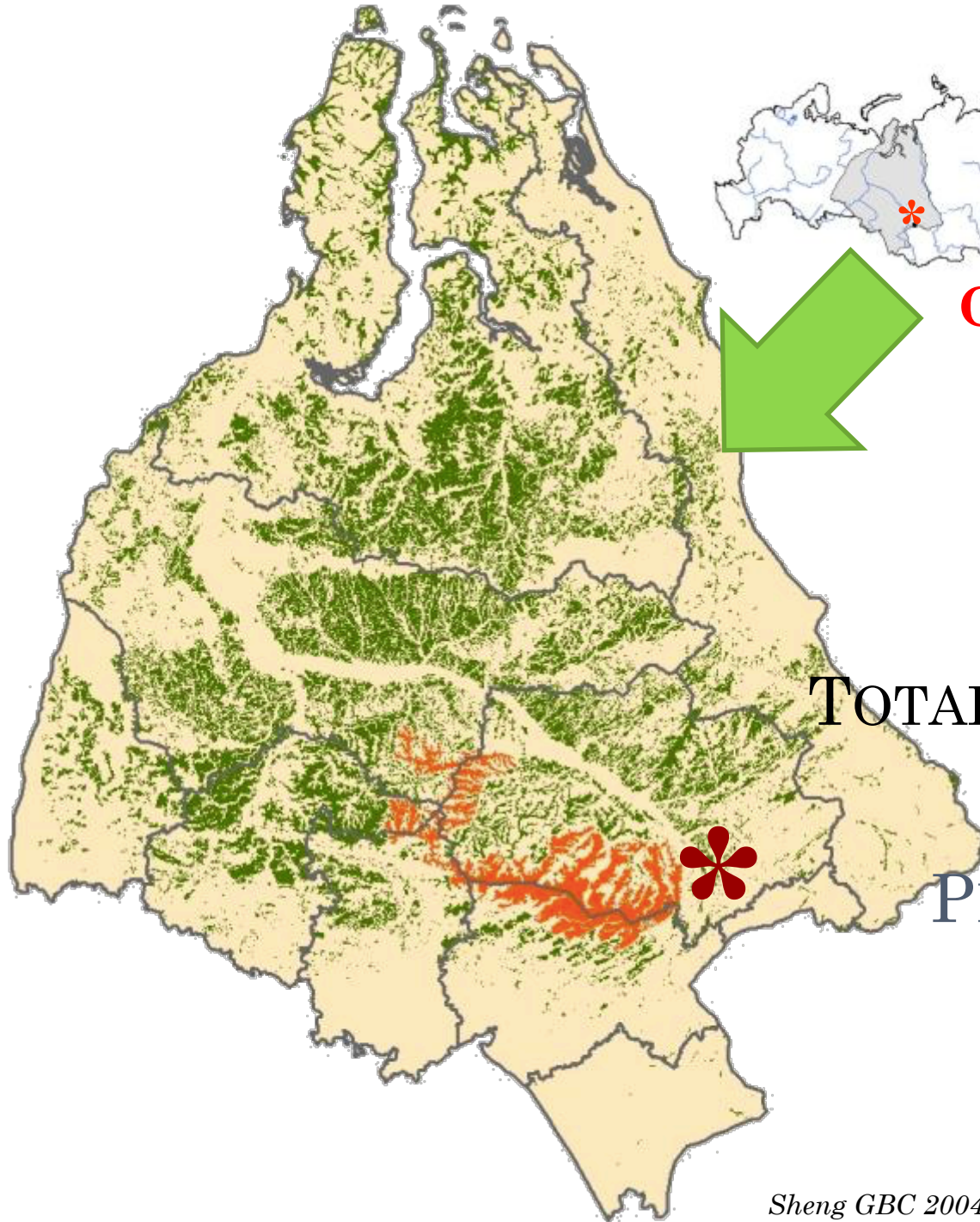
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Peatlands cover 3% of global surface and are important for:

- carbon storage (550 GT C globally)
- diverse goods and service to local livelihoods
- biodiversity conservation, services such as water regulation
- climate change adaptation



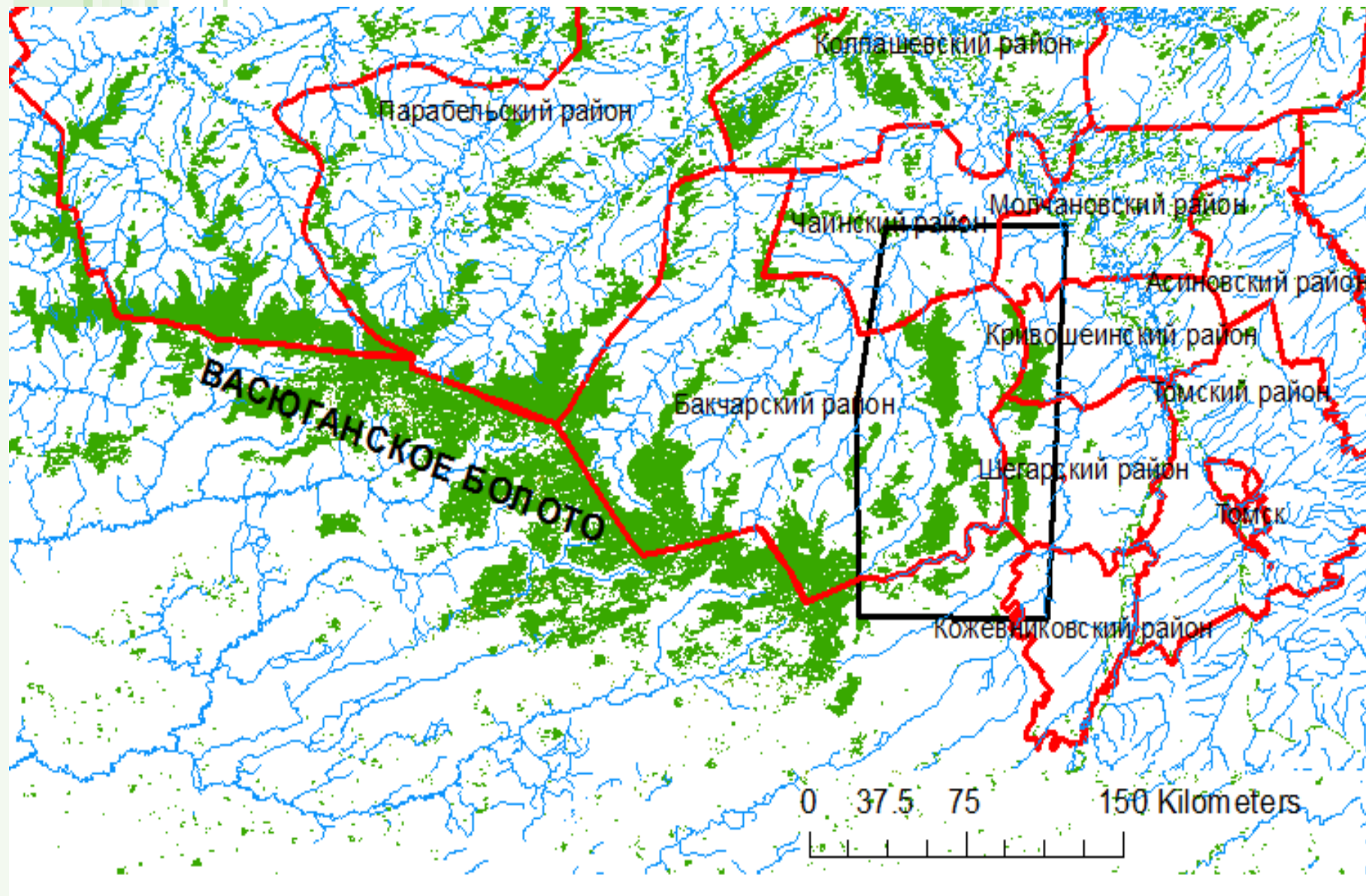
PEATLANDS OF WEST SIBERIA

TOTAL AREA
- 592 440 KM²
(36%),

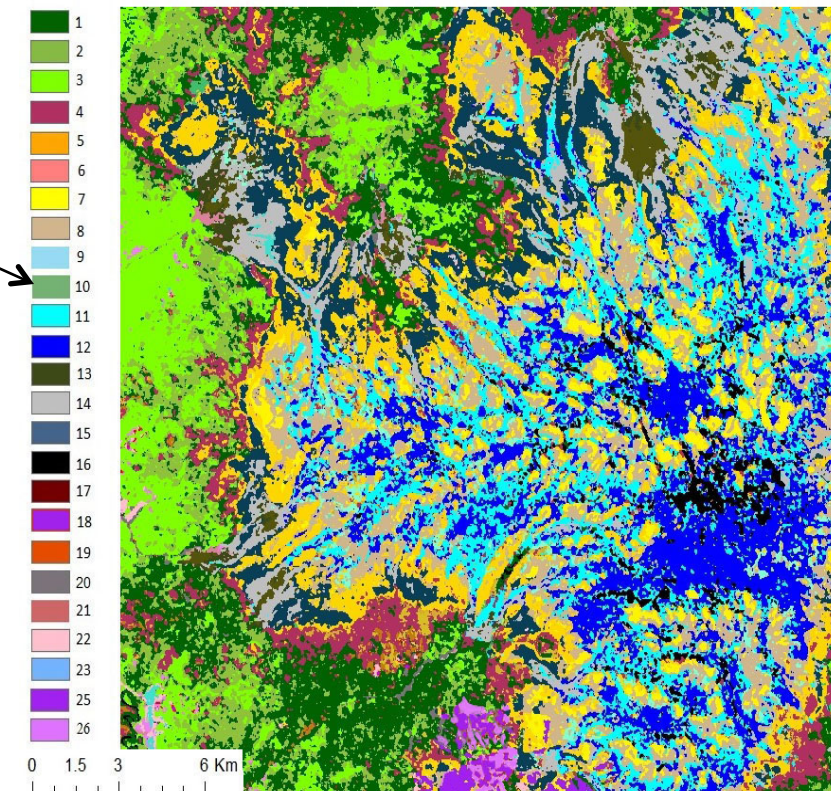
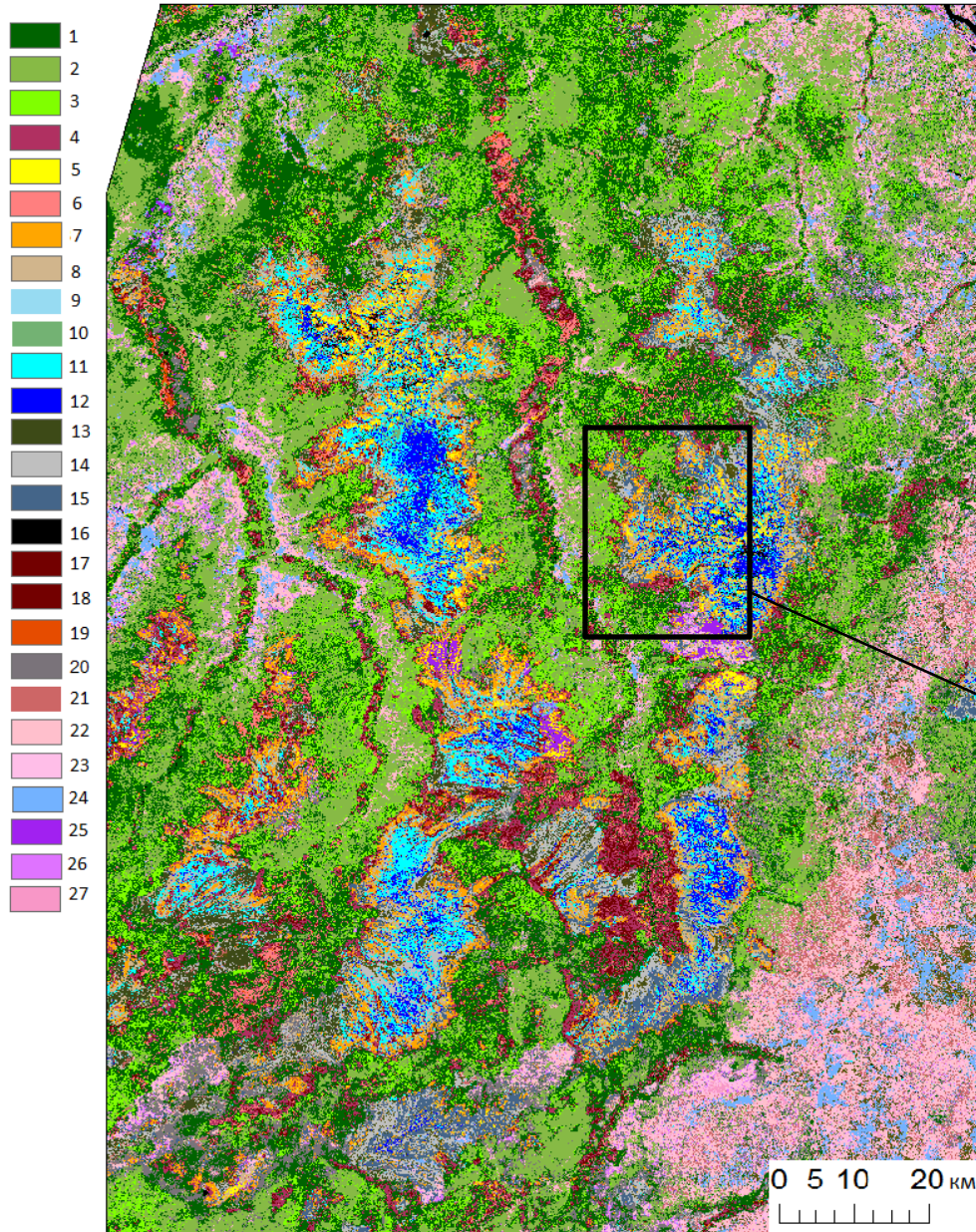
TOTAL WEIGHT OF PEAT
- 148 GT

PEAT CARBON POOL
- 70 GT C

STUDY AREA



SPATIAL STRUCTURE OF VEGETATION COVER

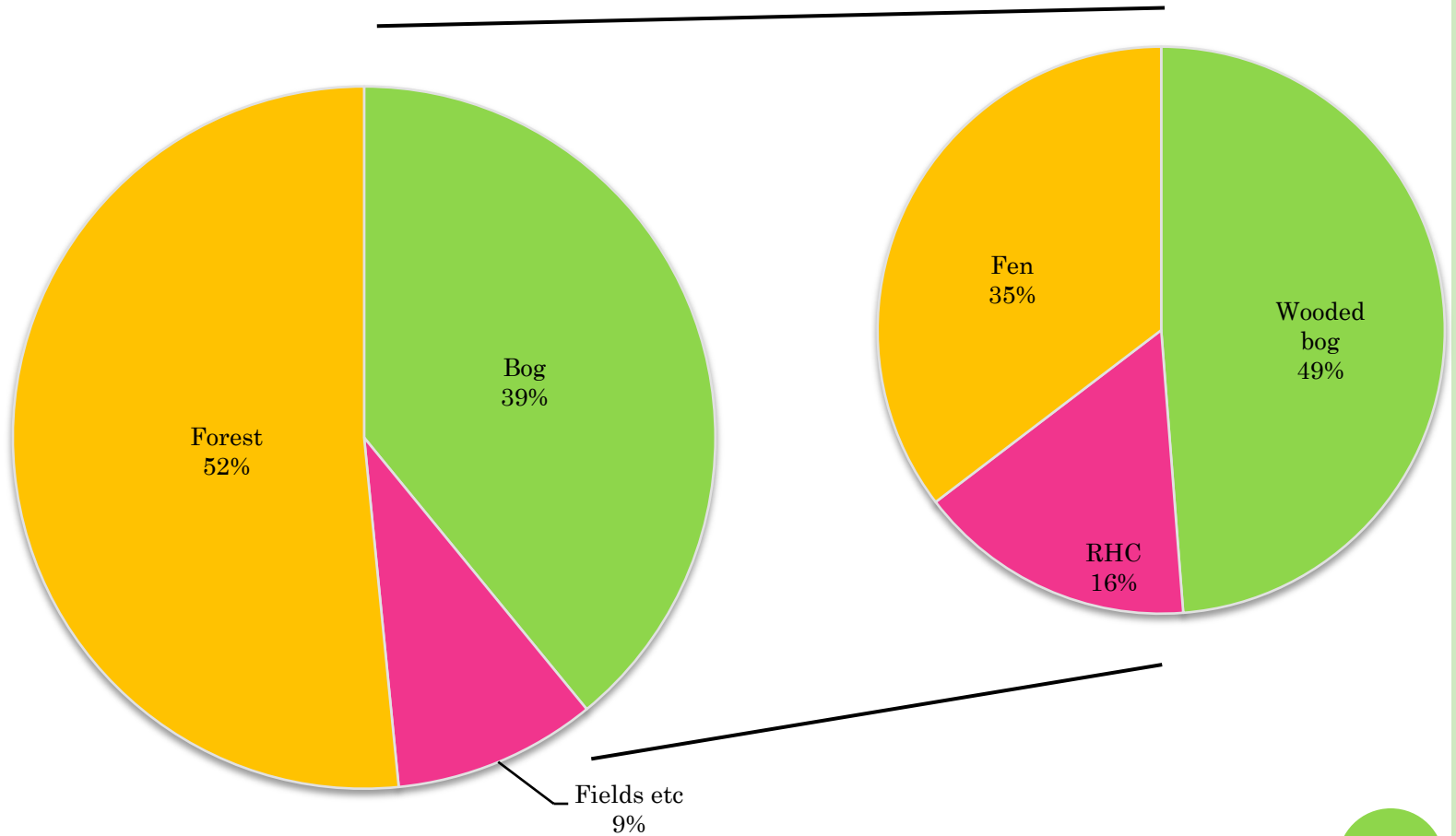


CLASSES OF GROUND COVER OF THE KEY AREA «BAKCHAR–IKSA» AND THEIR AREAS (S)

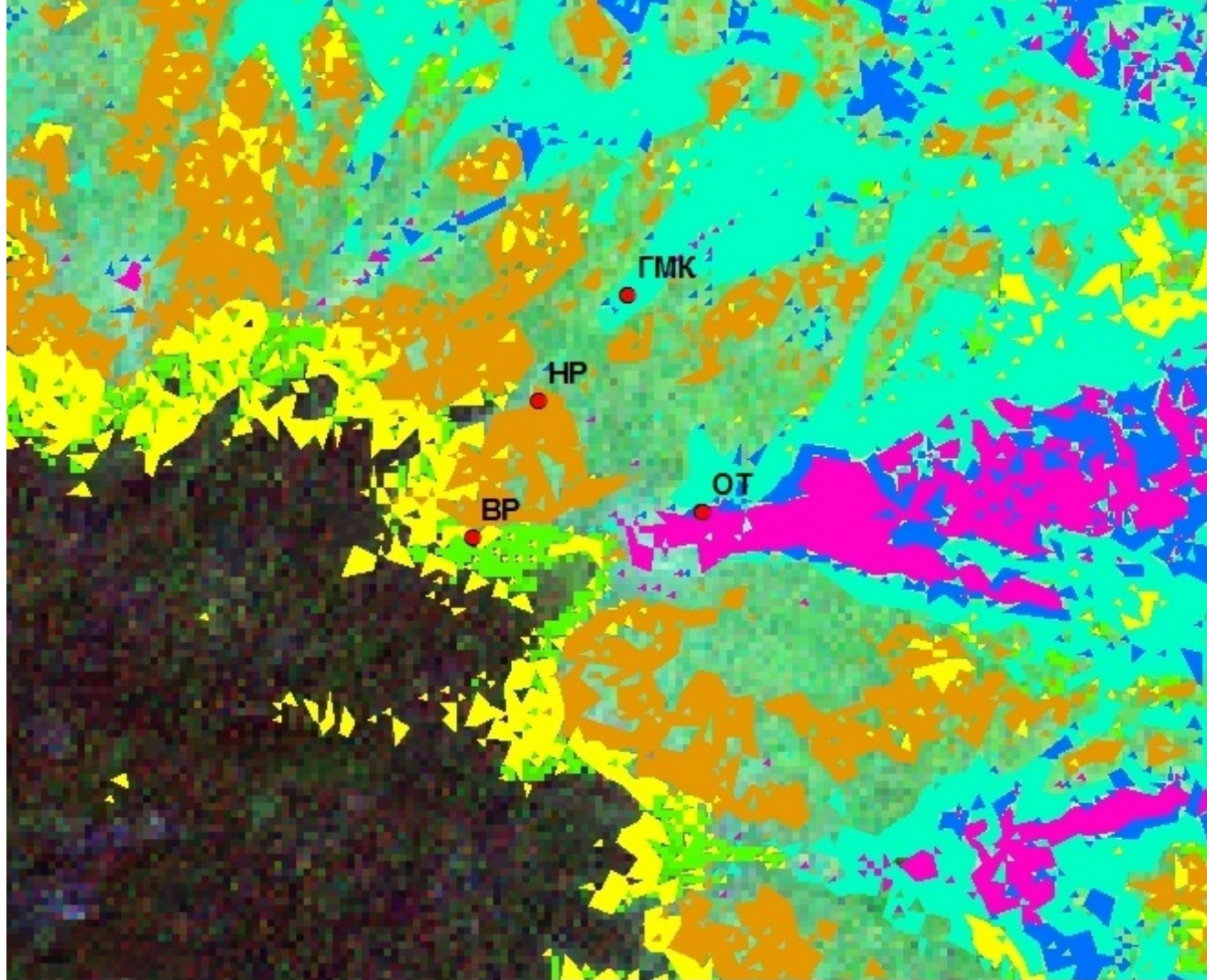
№	Class	Area, ha	Part of the key area, %
Forests		755443	51,6
1	Dark coniferous	354404	24,2
2	Deciduous	295378	20,2
3	Mixed	105661	7,2
Watershed bogs		437967	29,9
Wooded		218332	14,9
4	Tall ryam	80776	5,5
5	Medium ryam drained	7008	0,5
6	Low ryam drained	11638	0,8
7	Low ryam	65812	4,5
8	Small-hollow-ryam complex	47033	3,2
9	Medium-hollow-ryam complex	6065	0,4
Open		219635	15,0
10	Ridge-small-hollow complex	5578	0,4
11	Ridge-medium-hollow complex	57248	3,9
12	Ridge-large-hollow complex	28034	1,9

№	Class	Area, ha	Part of the key area, %
13	Scheuchzeria-sphagnum fen	37733	2,6
14	Sedge-sphagnum fen	46348	3,2
15	Sphagnum floating fen	39957	2,7
16	Water objects	4738	0,3
Terrace wetlands		108983	7,4
17	Bog pine forest	15259	1,0
18	Swamp forest	8354	0,6
19	Pine-herbs-moss	15503	1,1
20	Birch-herbs-hypnum	54133	3,7
21	Dwarf birch-sedge-hypnum	15735	1,1
Other lands		162443	11,1
22	Fields, meadow, croplands	122855	8,4
23	Floodplain	3956	0,3
24	Settlements	5450	0,4
25	Drained wooded bog	21667	1,5
26	Drained open bog	8519	0,6
Total		1464840	

DISTRIBUTION OF THE GENERIC GROUPS OF THE GROUND COVER OF THE KEY AREA



VEGETATION COVER NEAR THE GROUND POINTS



0 0.325 0.65 1.3 Kilometers



заб сосновый ОТ

НР гряд среднемоч ВР гряд крупномоч

Расчет вегетационного индекса NDVI основан на особенностях поглощения солнечной радиации в красной области электромагнитного спектра хлорофиллом и отражения ее в инфракрасной области спектра клеточными структурами листа. NDVI рассчитывается по формуле [4]:

$$NDVI = \frac{P_{NIR} - P_{RED}}{P_{NIR} + P_{RED}},$$

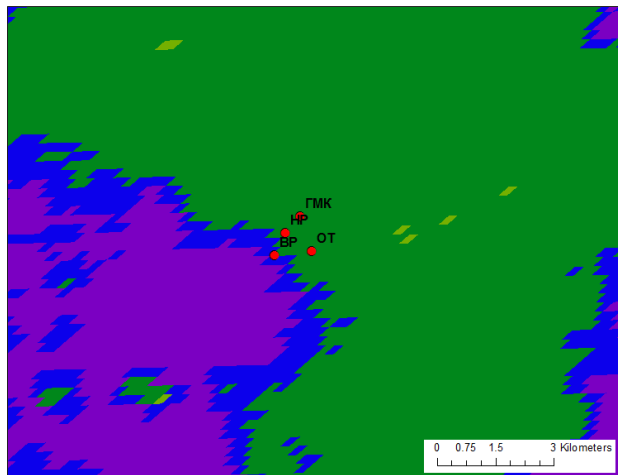
где P_{NIR} - значения яркости пикселя в ближнем инфракрасном диапазоне, P_{RED} - в красном диапазоне.

Усовершенствованный вегетационный индекс EVI (Enhanced Vegetation Index, Enhanced Vegetation Index) рассчитывается по следующей формуле [4]:

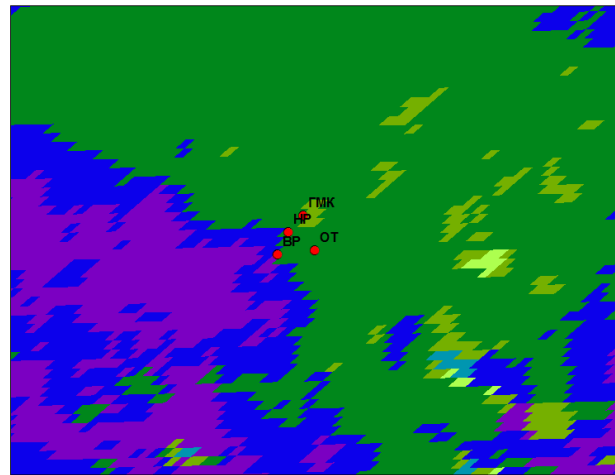
$$EVI = 2,5 \left(\frac{P_{NIR} - P_{RED}}{P_{NIR} + 6 * P_{RED} - 7,5 * P_{BLUE} + 1} \right),$$



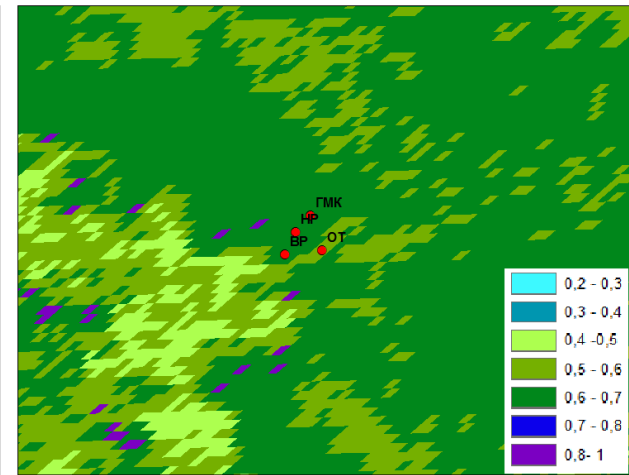
NDVI MAPS



10.06.2011

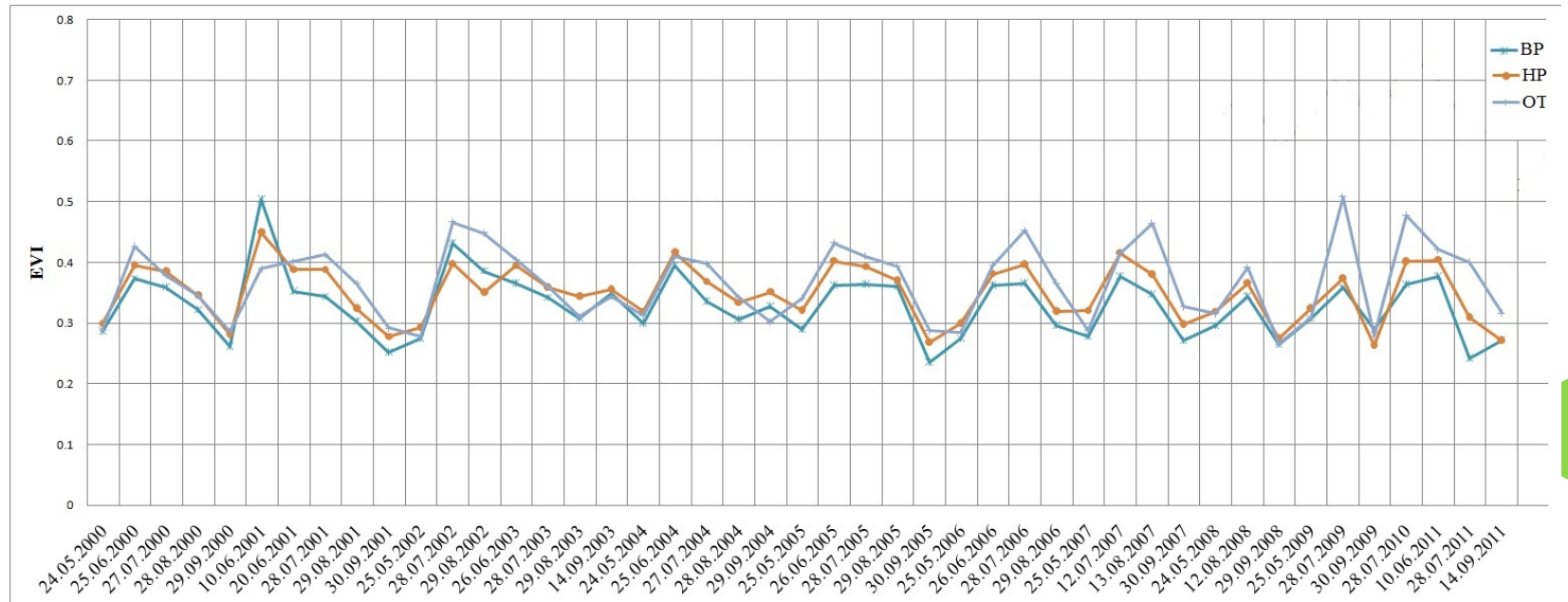
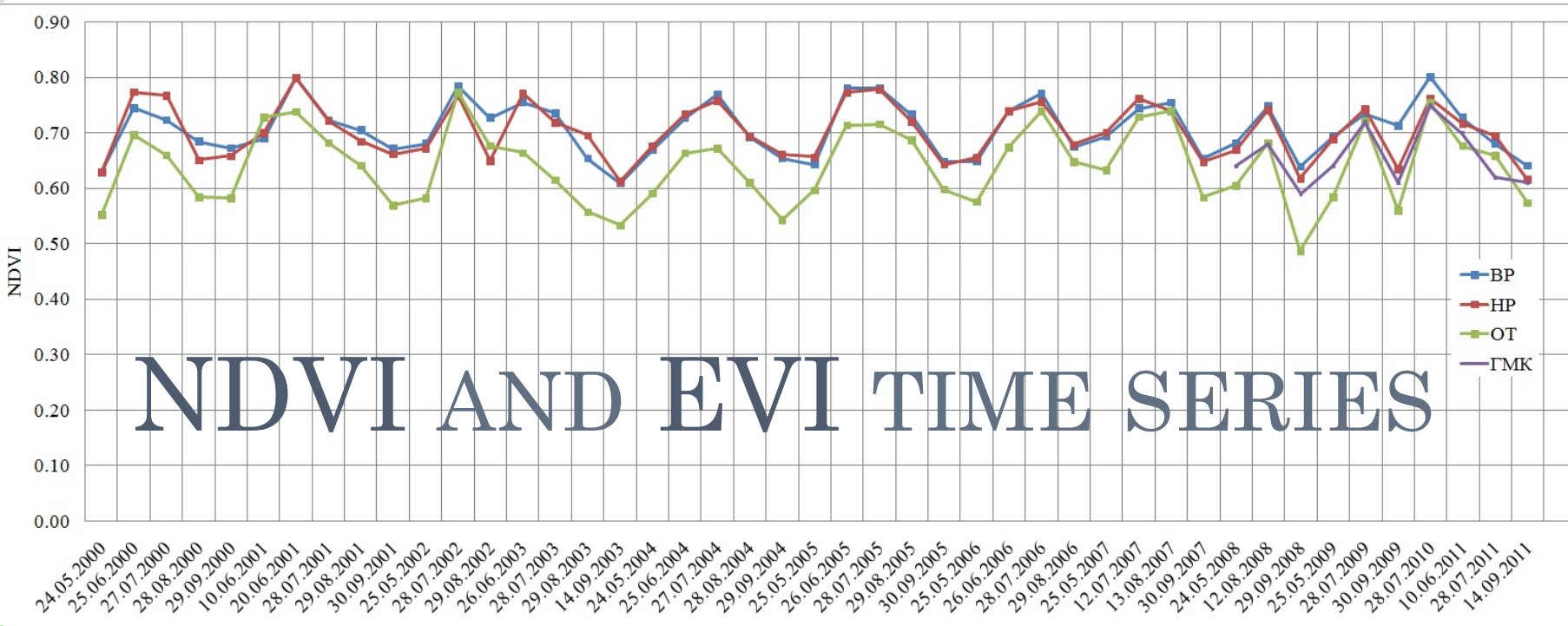


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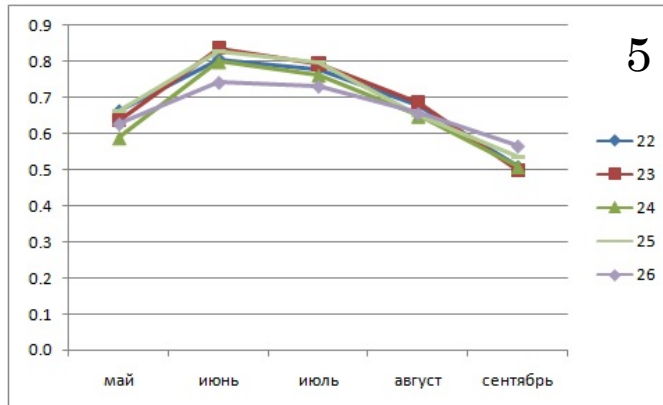
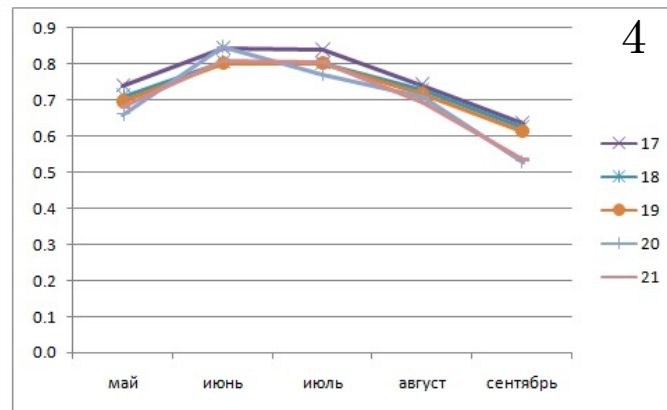
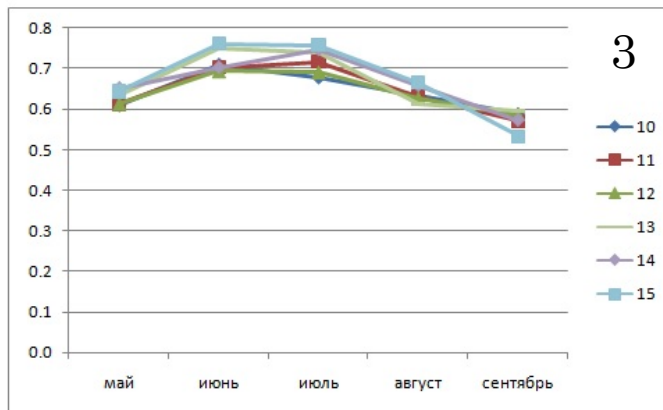
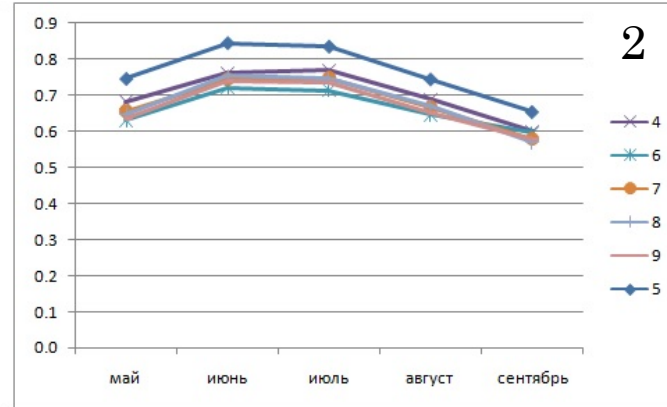
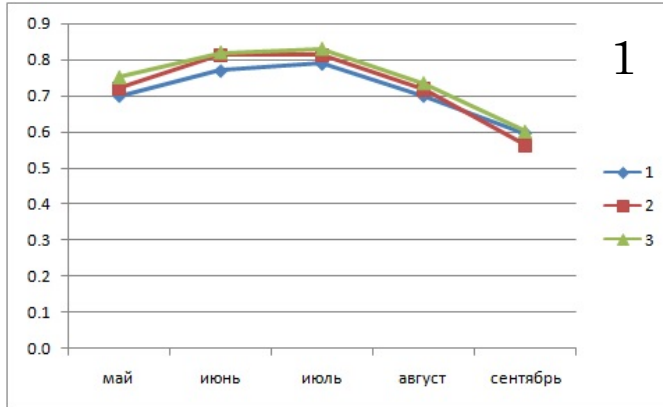


14.09.2011.





CHANGING THE VALUE OF NDVI CLASS VEGETATION FOR A MONTH VEGETATION



1- леса

2- болота водораздельны

3- болота водораздельны

4- болота террасовые

5- прочие земли

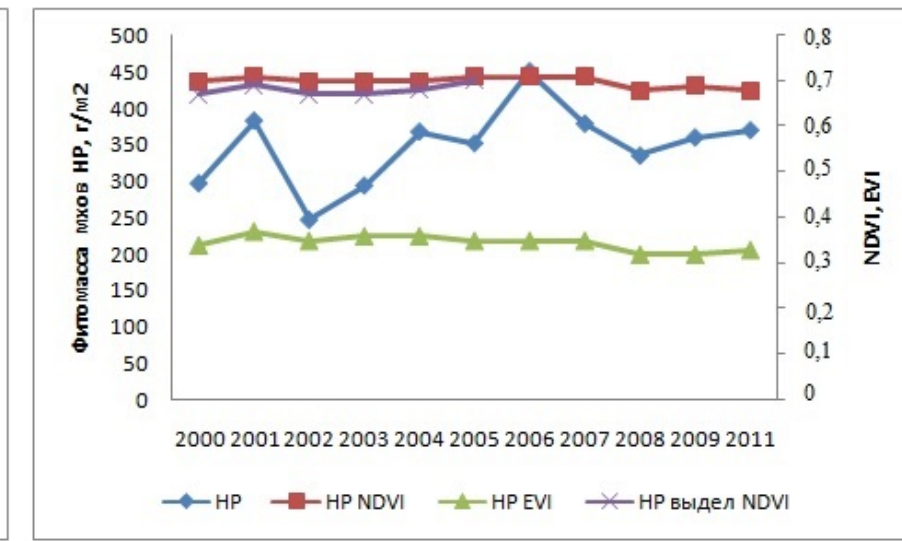
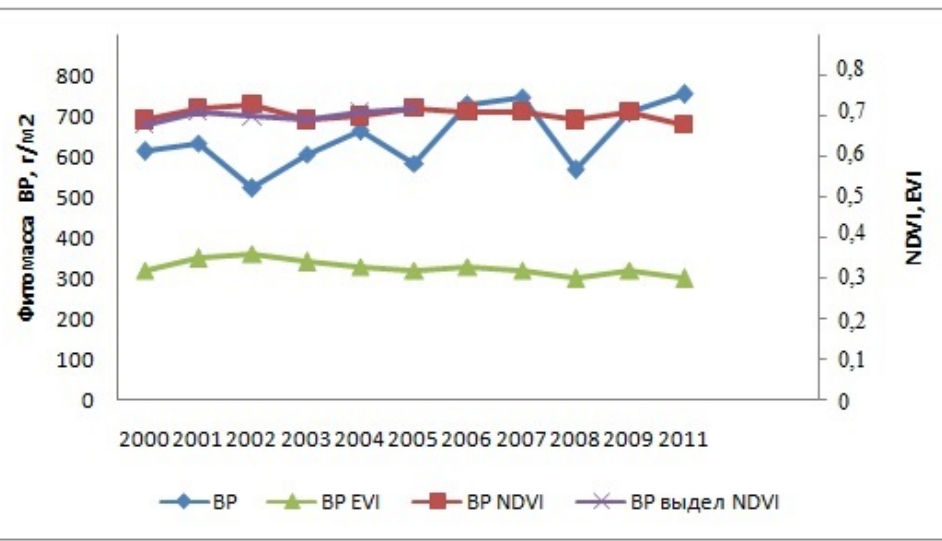
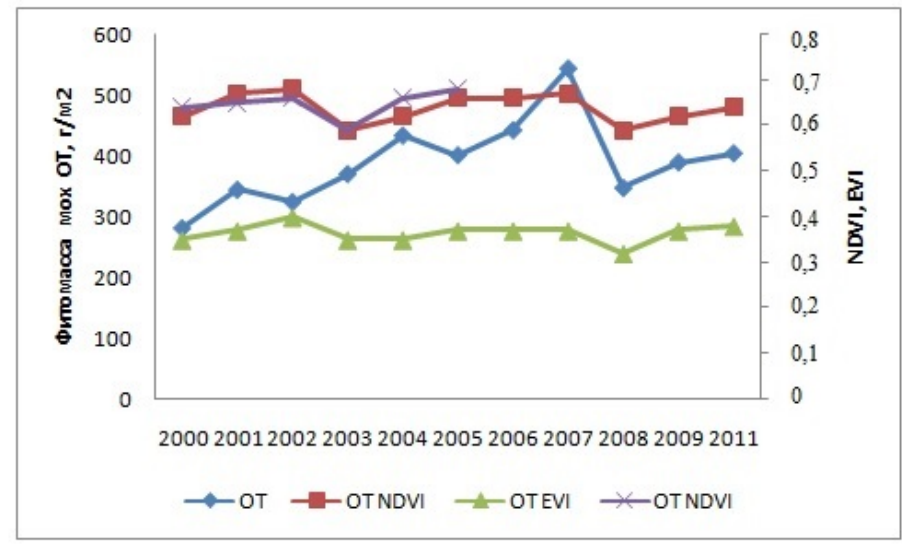
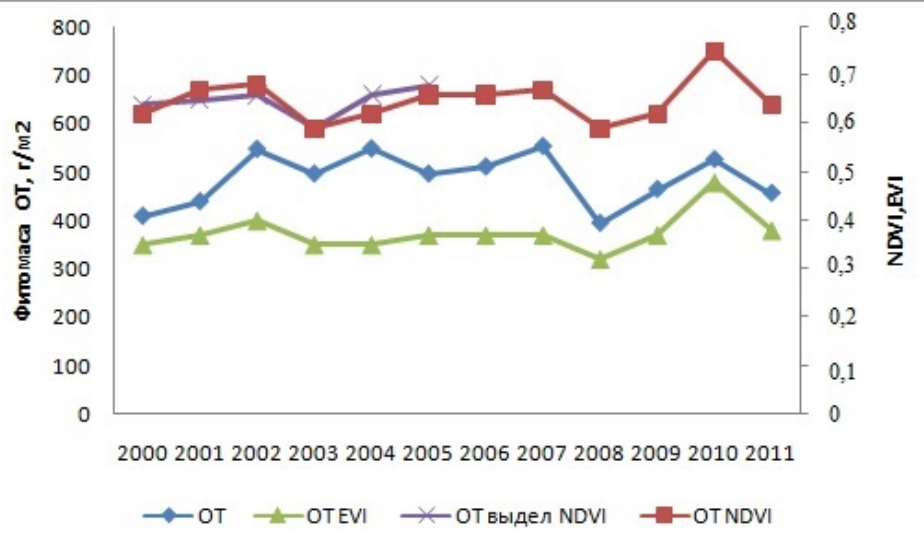
CORRELATION BETWEEN VEGETATION CHARACTERISTICS AND INDICES

Фитомасса/NPP	Экосистем ы	EVI	NDVI	NDVI выделы
общая фитомасса/ ANP	BP	0,003/-0,24	0,37/-0,13	0,07/0,62
	HP	-0,4/0,01	-0,47/0,01	0,48/0,68
	OT	0,46/-0,39	0,49/-0,37	0,2/-0,11
фитомасса трав/ NPPтрав	BP	-0,23/-0,13	-0,41/-0,47	-0,72/-0,85
	HP	0,62/0,69	0,47/0,51	-0,33/0,5
	OT	-0,27/-0,35	-0,41/-0,57	0,44/-0,67
фитомасса кустарничков/NPP кустарничков	BP	-0,05/-0,06	-0,24/0,05	0,36/0,75
	HP	-0,02/0,36	-0,14/0,47	-0,33/0,83
	OT	0,02/0,2	-0,02/0,3	0,75/0,5
фитомасса мхов/ NPP мхов	BP	-0,34/-0,21	-0,23/-0,19	-0,79/0,24
	HP	0,06/-0,09	0,23/0,17	0,32/0,08
	OT	0,14/-0,6	0,28/-0,3	0,21/0,34
NPP	BP	-0,31	-0,31	-0,11
	HP	0,01	0,03	0,6
	OT	-0,21	-0,42	-0,44

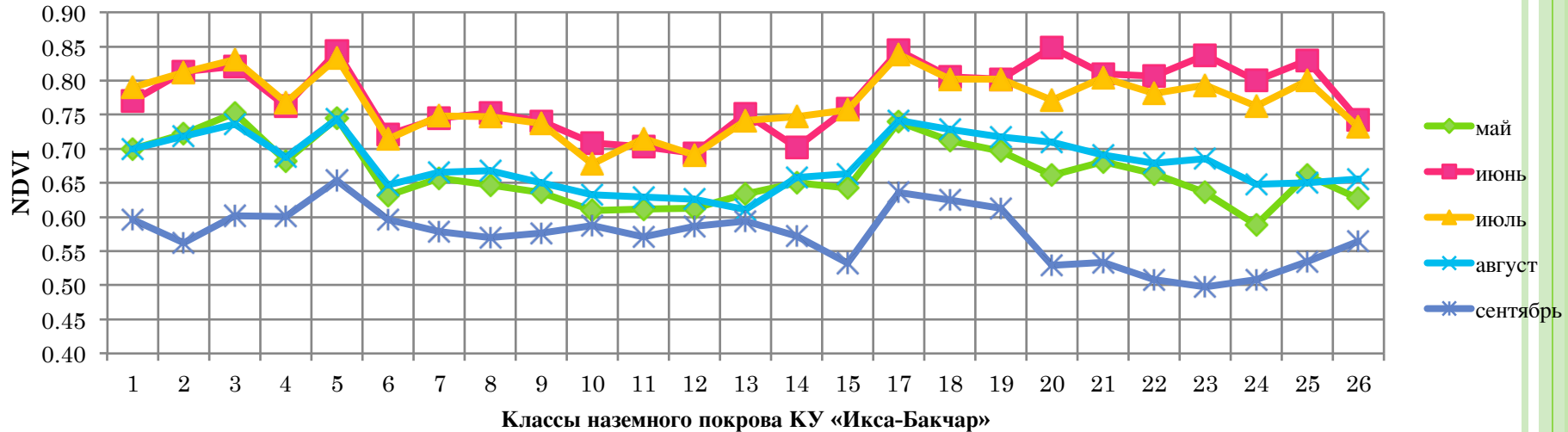
ANP- надземная фитомасса г/м²

NPP- чистая первичная продукция, г/м²/год

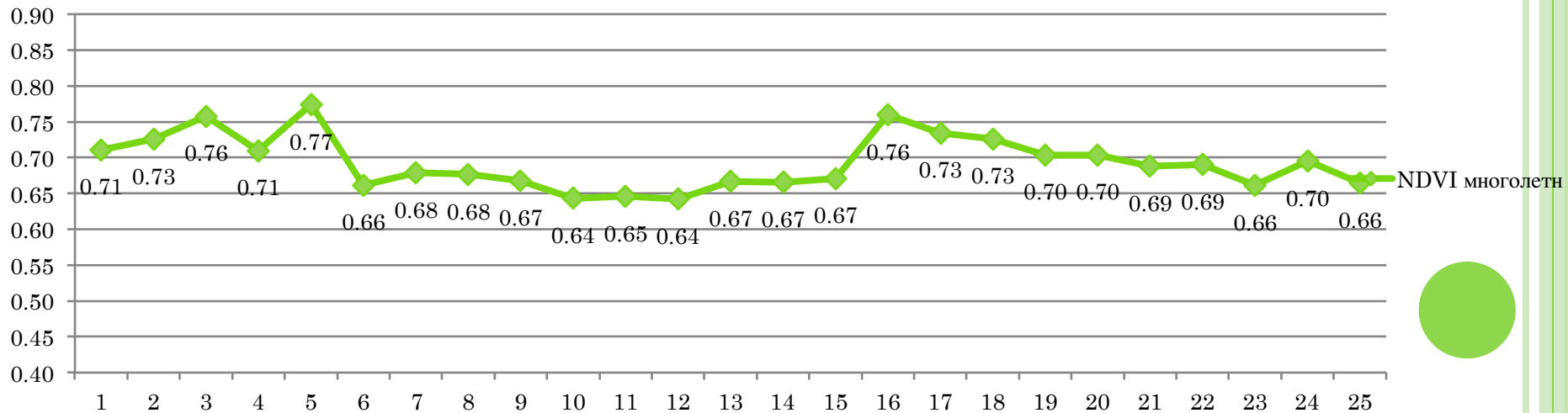
DYNAMICS OF PHYTOMASS AND EVI AND NDVI



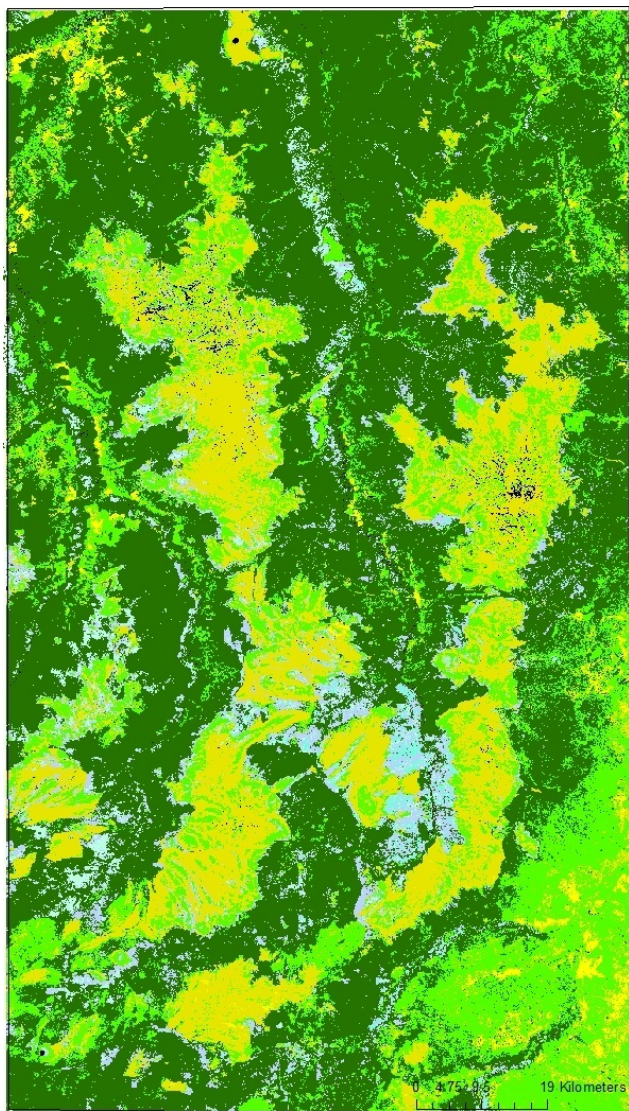
VARIATIONS OF NDVI FOR VEGETATION CLASSES DURING GROWING SEASON



Averaging NDVI in 2000-2005.



MAP ANNUAL AVERAGE PRODUCTION CLASSES VEGETATION

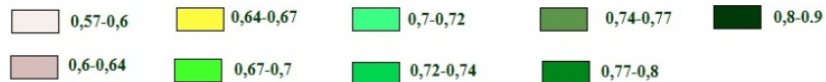
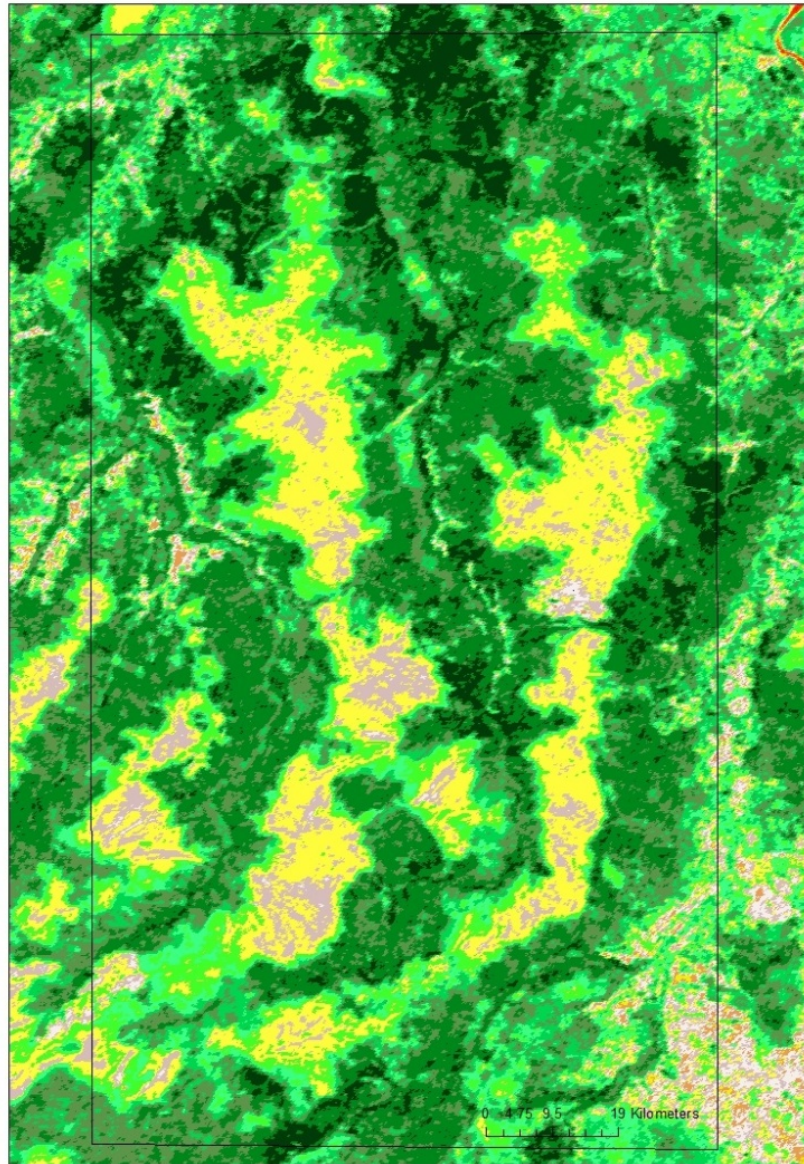


Фитомасса и продуктивность болотной растительности					
Бакчарское болото (Головацкая Е.А.)					
	ВР	НР	ОТ	ГМК	Безлесное евтрофное болото
Фитомасса, ц/га	131,3	122	103,5		220,2
NPP ц/га/год	65,15	59,7	53,85	59,32	
Западная Сибирь (Валуцкий, Храмов 1976, Базилевич, 1967)					
Фитомасса, ц/га	191,9-581,6		99		150
NPP ц/га/год	21,4-42,2				40,6

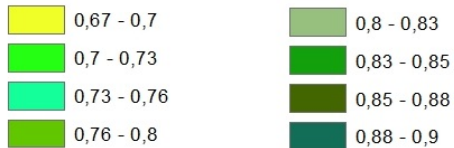
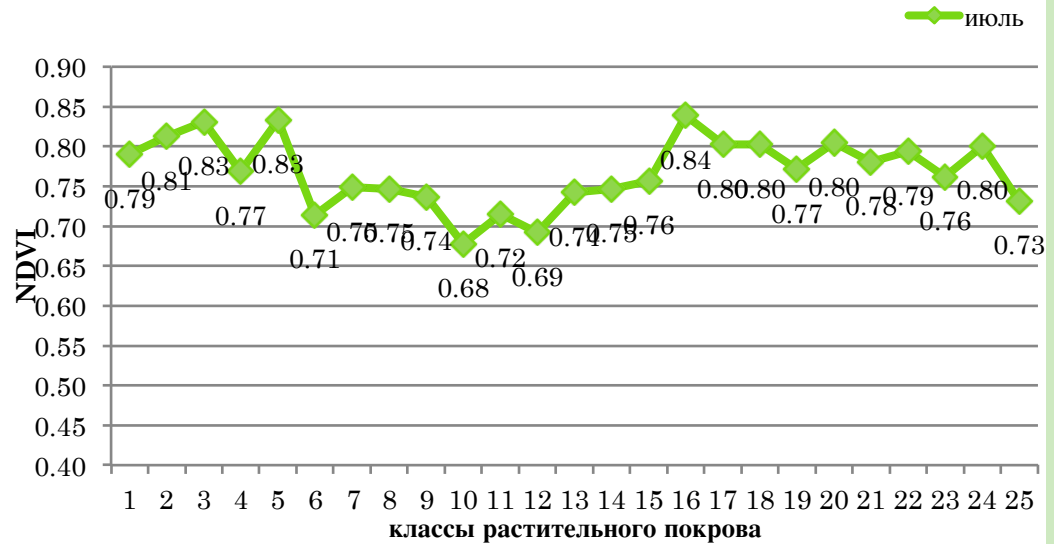
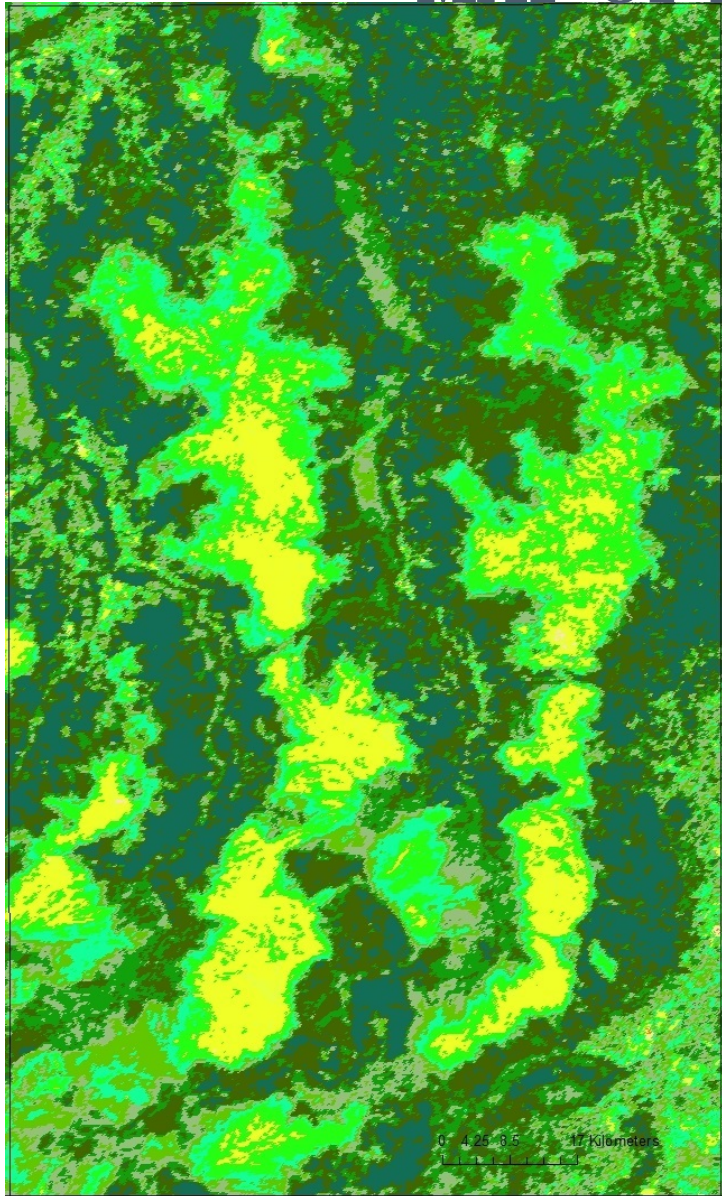
Запасы древесины м ³ /га				
кедр	сосна	пихта	ель	береза
194	116	175	159	153



MAP AVERAGE VALUE NDVI



MAP OF AVERAGE NDVI FOR JULY



CONCLUSION

- 1) Thematic processing of Landsat satellite images in the ERDAS Imagine and the formation of digital layers in ArcGIS will clearly mappable present spatial structure of land cover in the vast territory of KU "Bakchar-Iksa."
- 2) found link between average phytomass, ANP and indexes NDVI and EVI at the point of ground investigations or for the vegetation classes. The link is due to production of shrubs and sphagnum moss.
- 3) averaged over 2000-2005. NDVI values make it possible to map the average productivity of vegetation classes on the base of satellites images Landsat and MODIS products

