

# Mapping HNV Farmland in Germany 2009 to 2015

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# HNV farming systems in Germany?

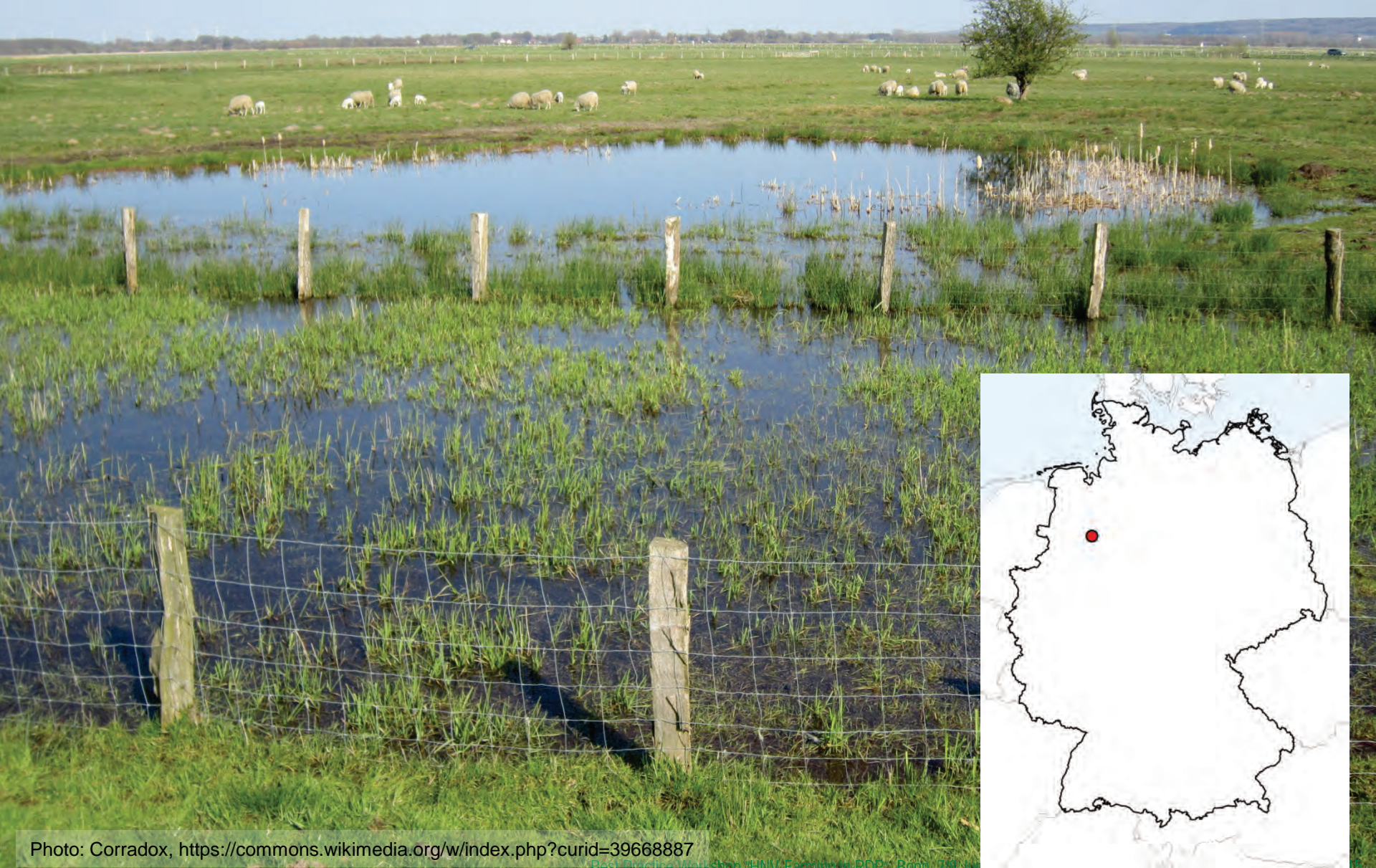


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# HNV farming systems in Germany?



Aerial photo: © GeoBasis-DE / BKG 2016

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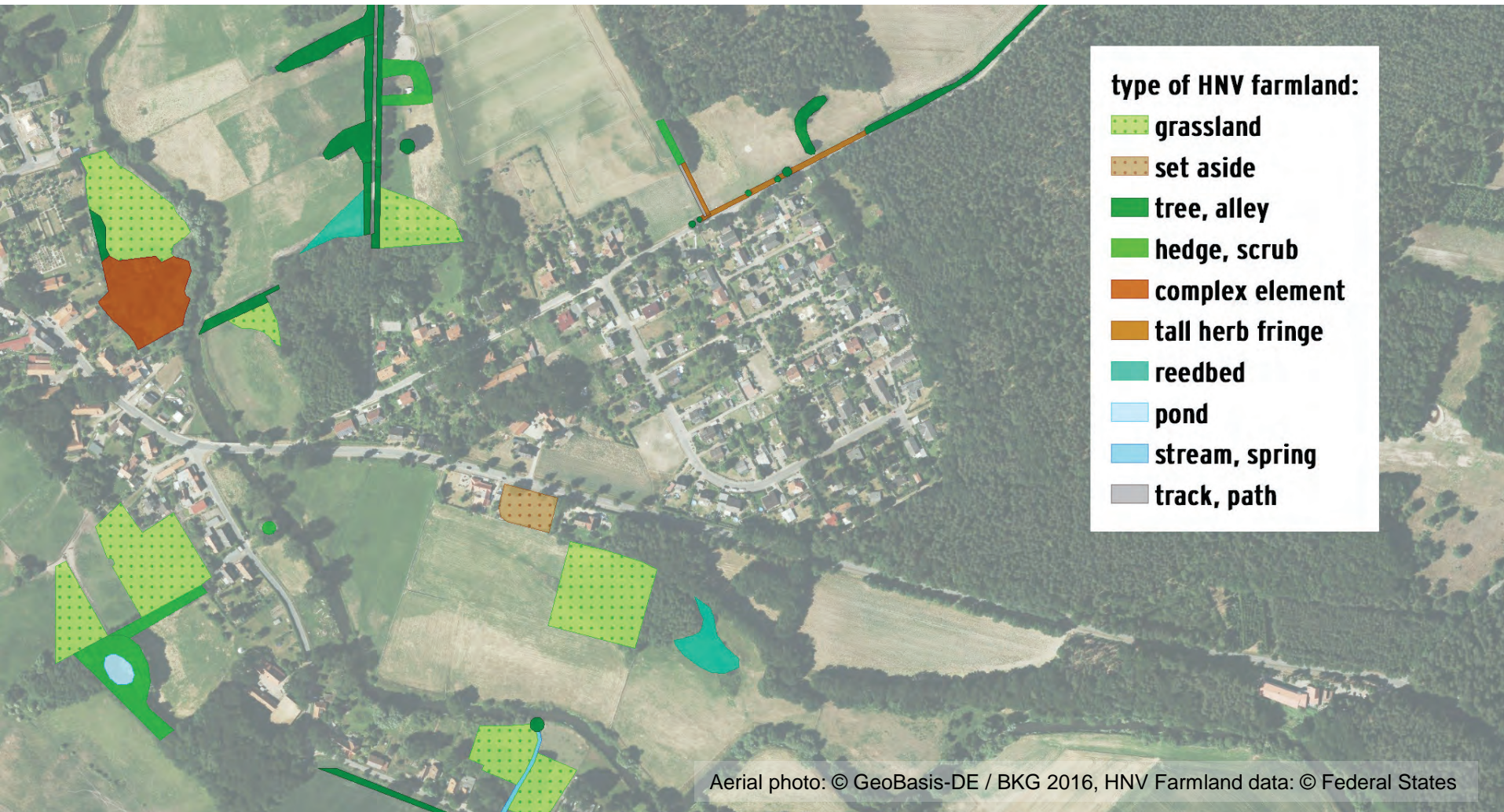


# HNV farmland in Germany





# Types of HNV farmland in Germany





# Criteria for mapping HNV farmland

- Statistical reliability
- Adequate sensitivity regarding changes
- Adequate temporal resolution (resampling rate suitable to information requirements of the CAP)
- Both size and condition/quality of HNV farmland units must be recordable
- Small HNV areas must be detectable
- Reasonable costs
- Homogeneity on national level



# Data procurement in a federal country

- 16 federal states (13 RDPs).
- Federal states responsible for data assessment in the fields of nature conservation and agricultural policy.
- Relevant data mostly not comparable between the federal states.
- Harmonization of relevant datasets on national level often difficult or not possible.
- Analysis of available data showed that adapting existing programmes would be more expensive than to establish a focused, harmonized and moderately prized HNV monitoring programme.





# HNV farmland monitoring programme

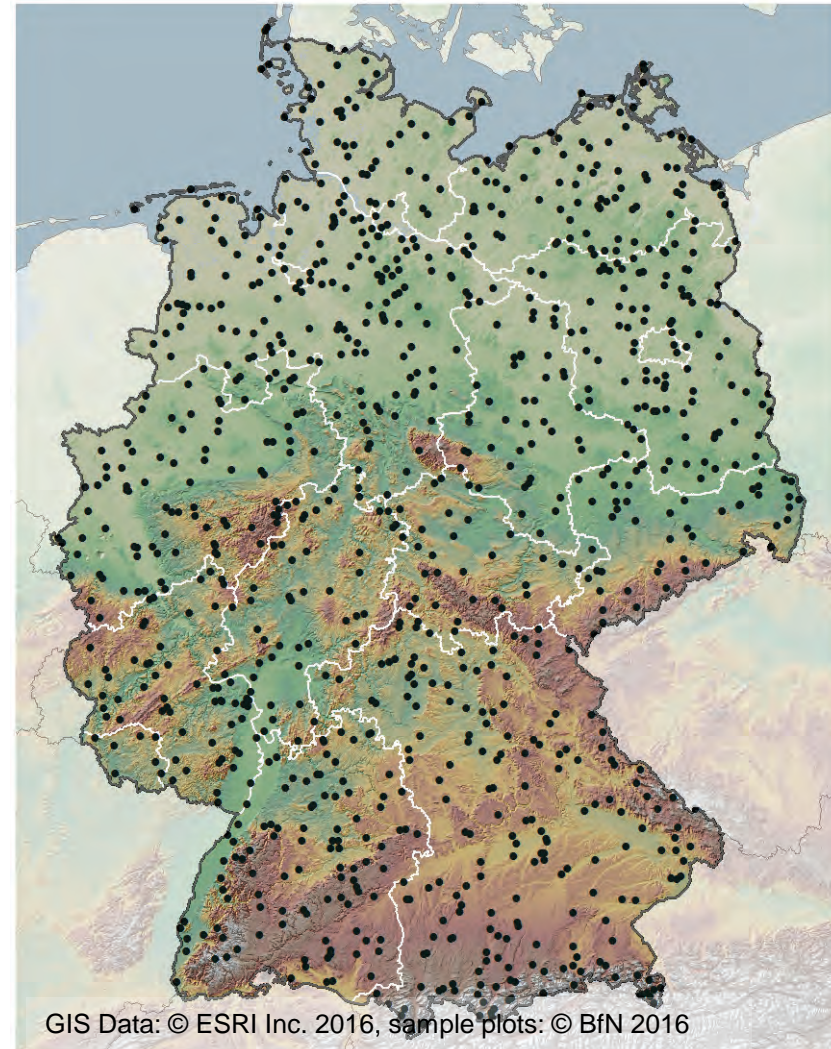
HNV farmland monitoring based on an existing stratified random sample design.

Sample design is used by the German Common Birds Census since 2004.

Base sample consists of 1,000 sample plots of 1km<sup>2</sup> each.

For more detailed results on regional level an extended sample can be used.

All sample plots of the base sample containing more than 5% of open area are included in the HNV farmland monitoring programme.



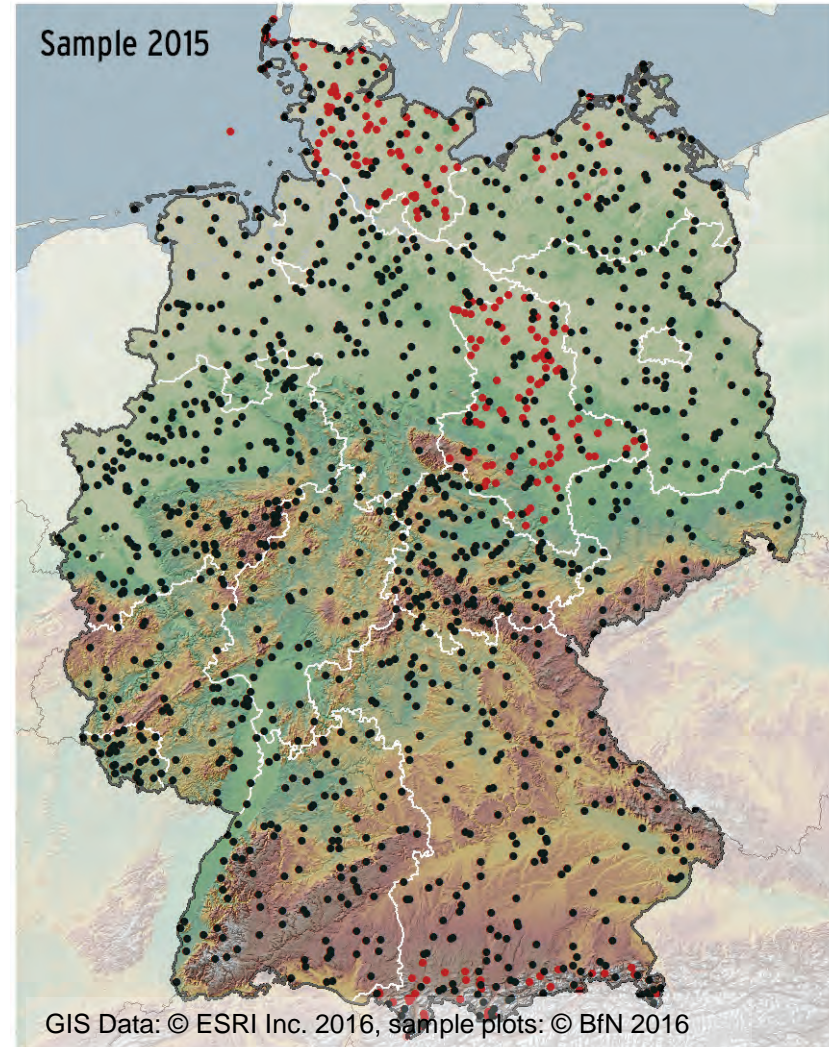


# Monitoring programme: sample

Baseline survey in 2009 used base sample in 10 and extended sample in 3 federal states.

Since then, more federal states extended their sample.

Actual sample size is 1,200 plots nationwide.

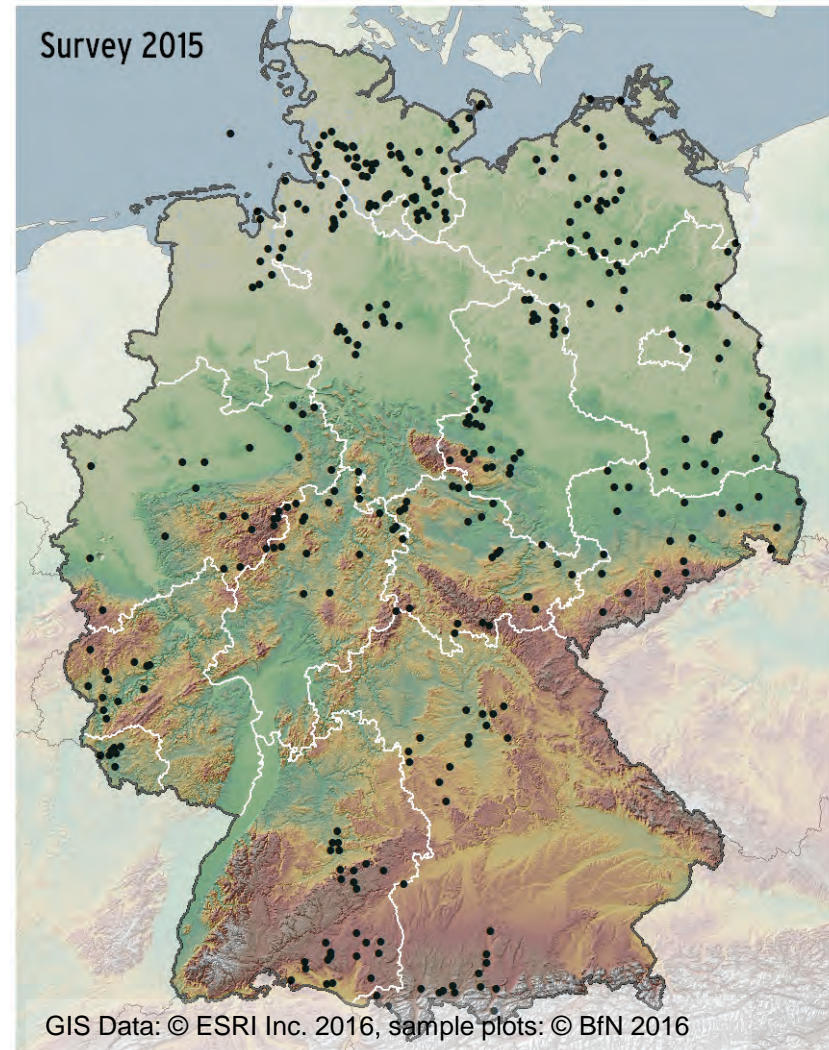




# Monitoring programme: survey cycles

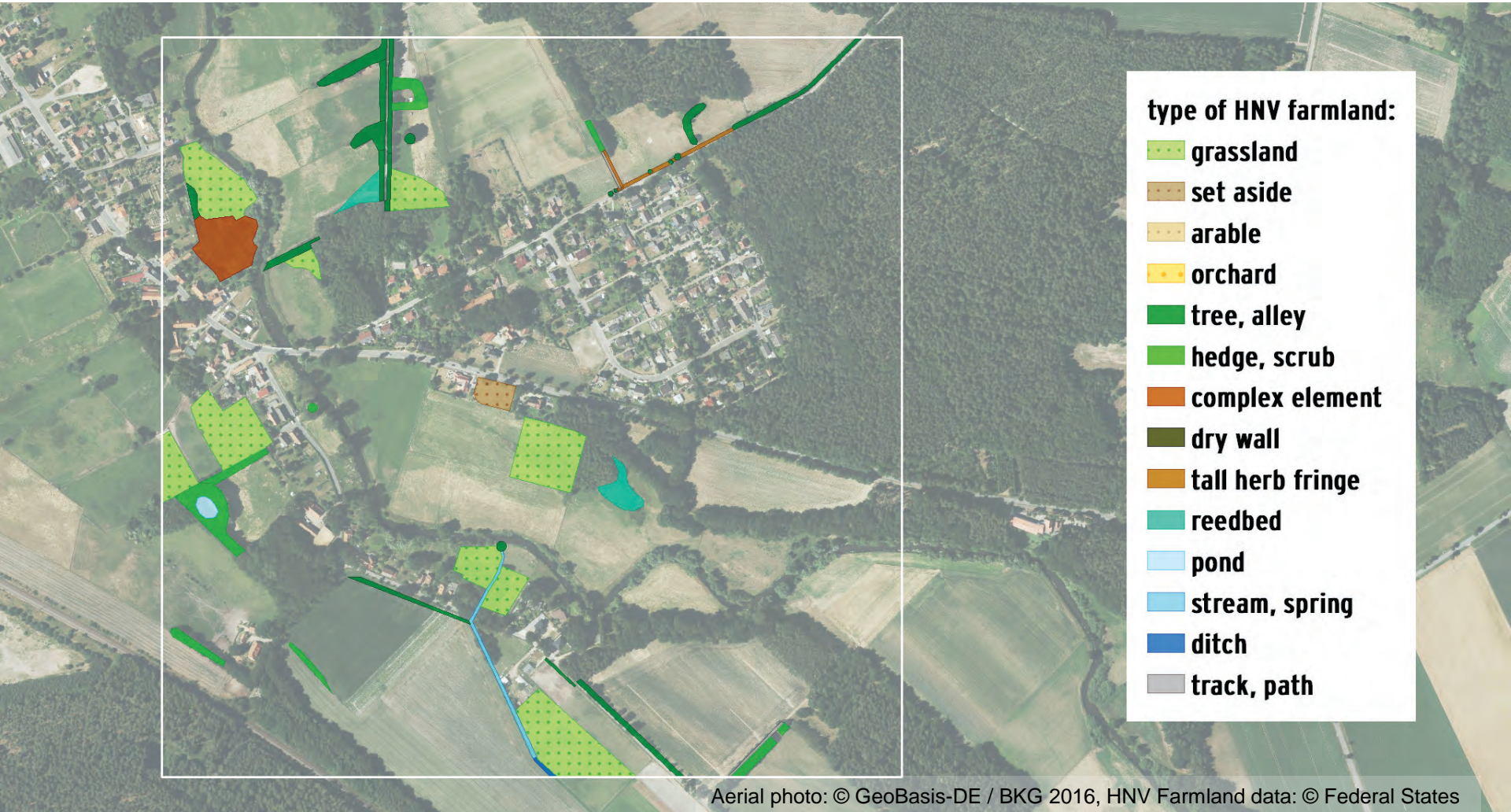
In 2009, all plots were surveyed in the field.

Since then, roughly  $\frac{1}{4}$  of the total sample is re-surveyed every year.





# Sample square (100 hectares)



Aerial photo: © GeoBasis-DE / BKG 2016, HNV Farmland data: © Federal States



# Characteristic taxa on transects



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# Character taxa for HNV grassland

Character taxa for a regional classification of grassland for the High Nature Value Farmland (HNV Farmland) indicator in Germany

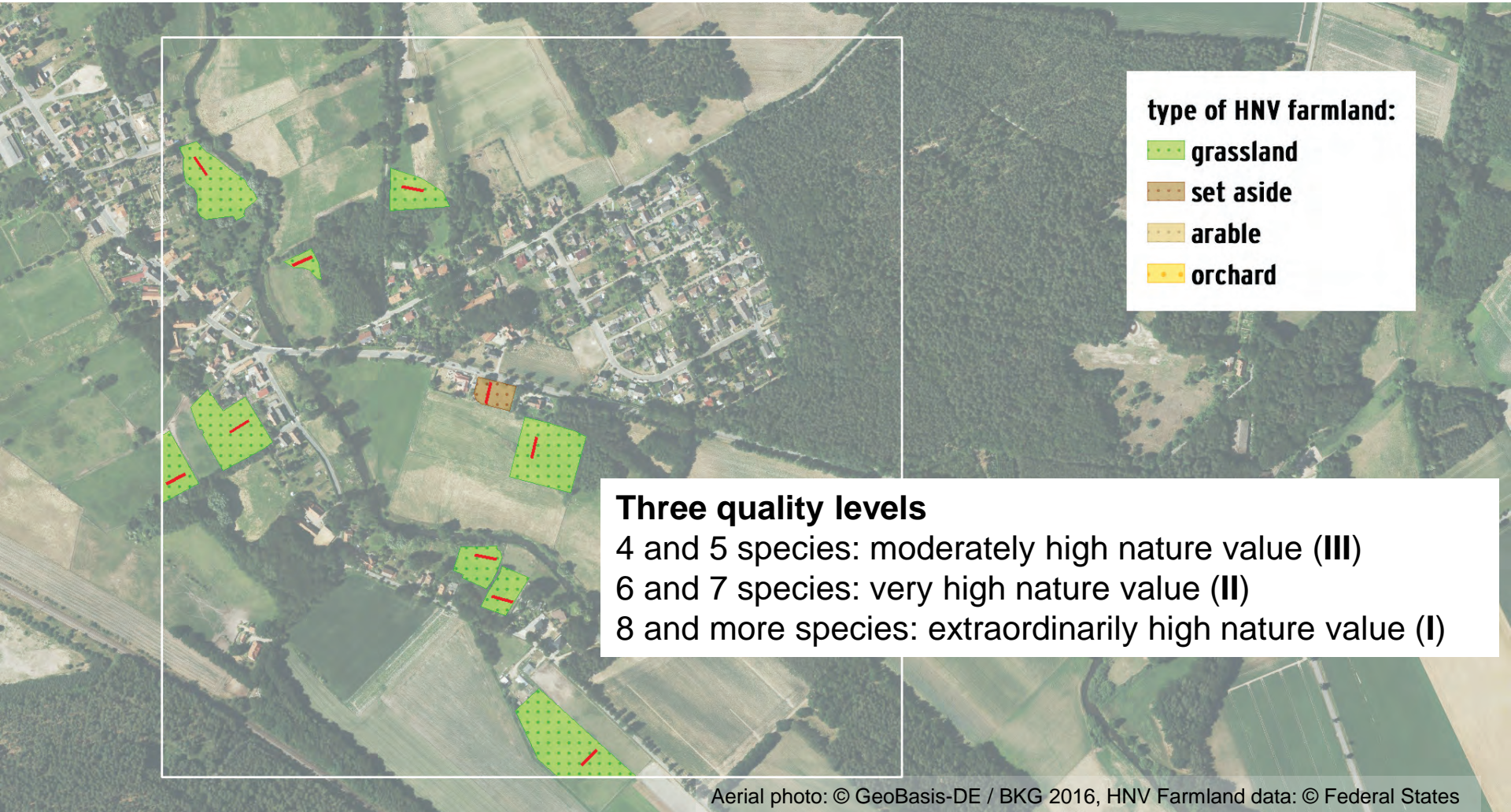
Regions: **NO** = *Bundesländer* (states) Mecklenburg-Vorpommern and Brandenburg, **NW** = Schleswig-Holstein and Lower Saxony, **MW** = Hesse, Rhineland-Palatinate and Saarland, **MO** = Saxony-Anhalt and Thuringia, **SN** = Saxony, **BW** = Baden-Württemberg and **BY** = Bavaria).

**+** signifies that the corresponding taxon/taxa counts/count as character taxon for grassland in the respective region. Grassland with a minimum score of 4 characteristic taxa on a 30 by 2 meter transect is classified as HNV grassland

Taxon	NO	NW	MW	MO	SN	BW	BY
<i>Achillea millefolium</i>		+	+	+	+		
<i>Achillea ptarmica</i>	+	+					+
<i>Agrimonia eupatoria</i>				+	+		
<i>Ajuga reptans</i>		+	+				
<i>Alchemilla spec.</i>		+	+		+		
<i>Anthoxanthum odoratum</i>	+	+			+		
<i>Armeria spec.</i>	+				+		
<i>Briza media</i>							+
<i>Caltha palustris</i>	+	+	+	+	+	+	+
<i>Campanula spec. (excluding Campanula glomerata)</i>	+		+	+	+	+	+
<i>Campanula glomerata</i>			+			+	+
<i>Cardamine pratensis</i>	+	+		+		+	+
<i>Carex spec. (tall sedges)</i>	+						
<i>Carex spec. (medium and small sedges, excluding Carex hirta)</i>		+					+
<i>Scirpus spec., Bolboschoenus spec.</i>							
<i>Carlina vulvaris. Carlina acaulis</i>				+			



# Quality levels of HNV farmland



**type of HNV farmland:**

- grassland
- set aside
- arable
- orchard

**Three quality levels**

- 4 and 5 species: moderately high nature value (III)
- 6 and 7 species: very high nature value (II)
- 8 and more species: extraordinarily high nature value (I)

Aerial photo: © GeoBasis-DE / BKG 2016, HNV Farmland data: © Federal States



# Quality levels of HNV farmland



## Example – Quality levels for HNV hedges

**HNV I:** Extremely diversely structured and species rich, multi-level and/or with fringe, width > 10 m or > 8 locally indigenous woody species

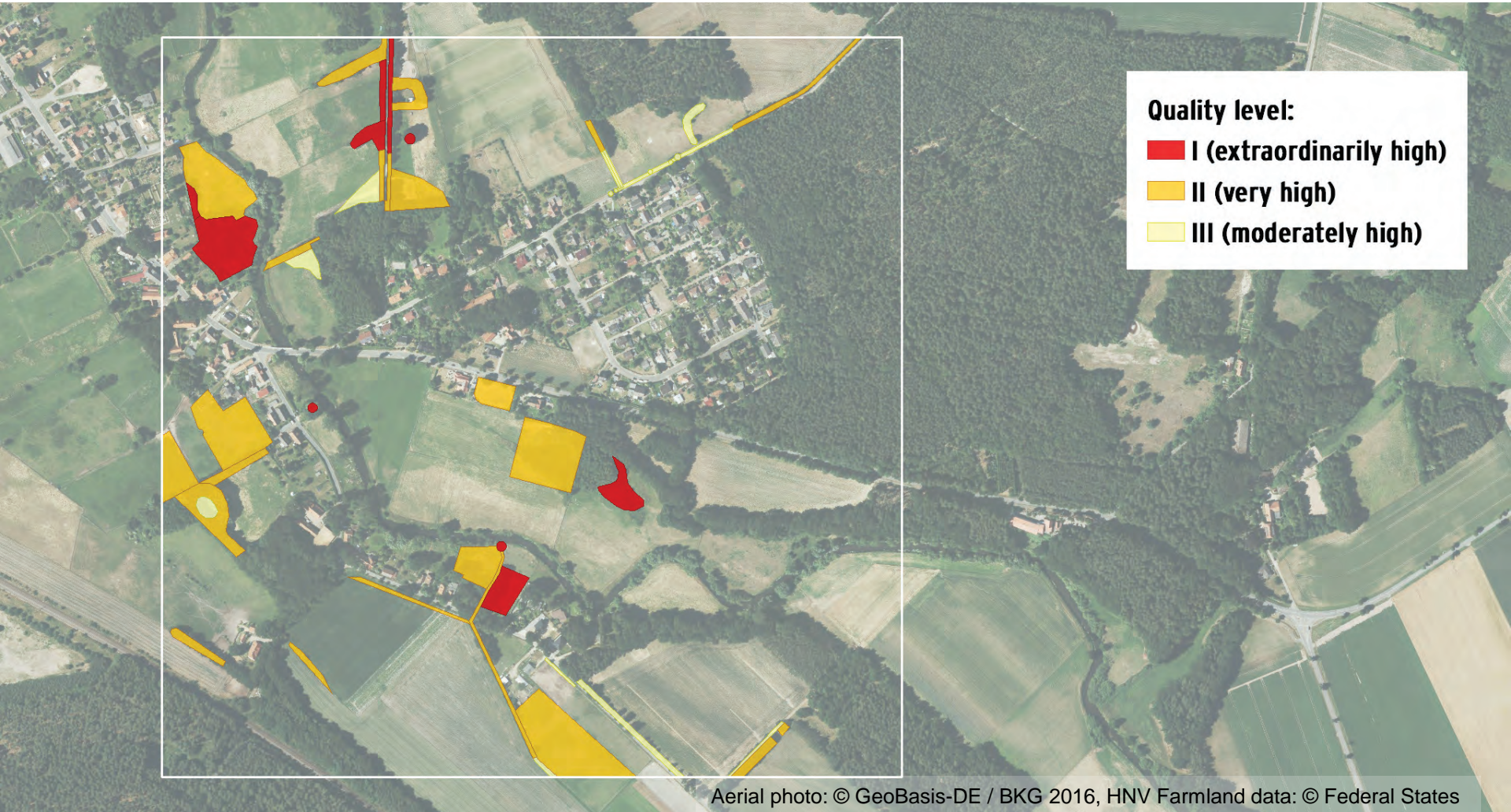
**HNV II:** Diversely structured or species rich, multi-level or with fringe, width > 5 m or > 5 locally indigenous woody species

**HNV III:** Simply structured hedges, scrub or copses with up to 5 woody species

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# Quality levels of HNV farmland





# Quality control in the field

Only experienced field ecologists are commissioned to conduct field work for the HNV farmland monitoring.

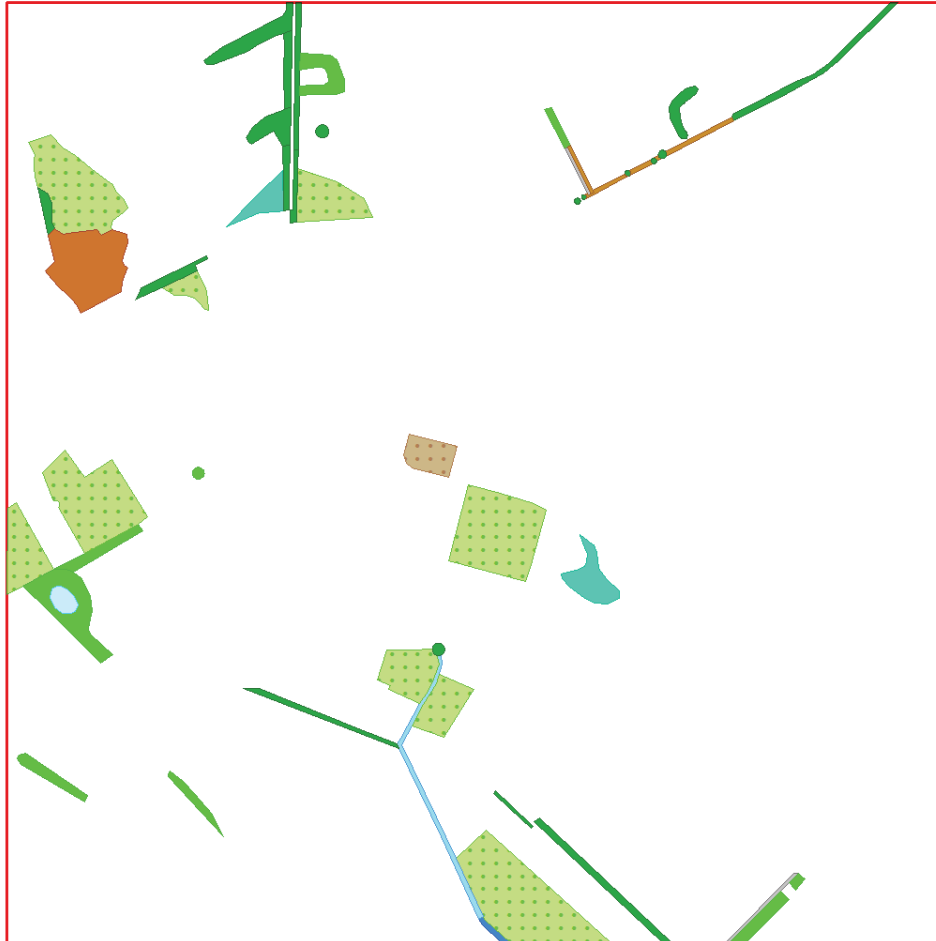
The Federal Agency for Nature Conservation BfN has put a comprehensive quality management system in place to obtain maximum data precision:

- Annual surveyor trainings
- Control mappings
- Technical control





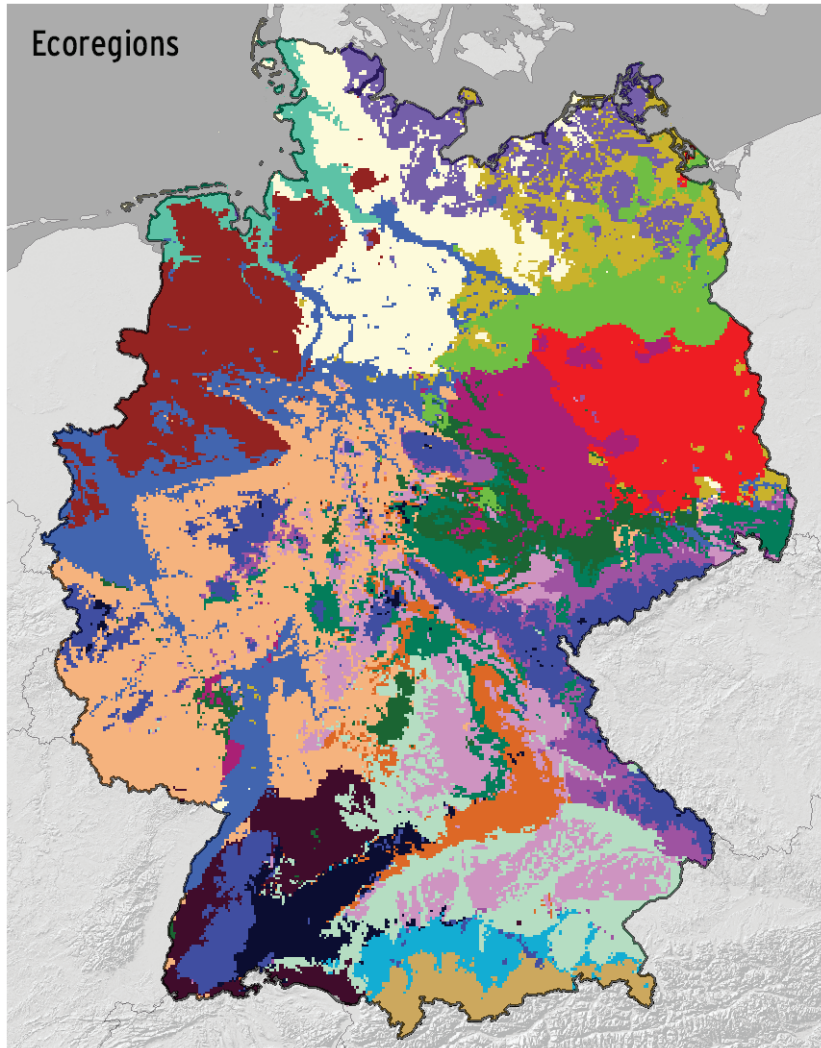
# Quality control: data processing



- Check for topological correctness of GIS data.
- Check for correct assessment of quality levels.
- Check for completeness.
- Check for complete documentation of all changes to former survey.
- Optical check (with areal photographs).



# Statistics: stratification





# Statistics: ratio estimator

$$Ind_{HNV} = \frac{HNV \text{ farmland (Germany)}}{Agricultural \text{ area (Germany)}}$$

 HNV farmland
   
 agricultural area

$$Ind_{HNV} = \frac{\sum_1^L \frac{A(\text{Stratum } L)}{A(\text{Germany})} \times \overline{HNV f(L)}}{\sum_1^L \frac{A(\text{Stratum } L)}{A(\text{Germany})} \times \overline{AA(L)}}$$

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# Indicator values 2009-2015

	<b>HNV farmland.</b>	<b>Sample error</b>
2009	13.1 %	0.5 %
2011	12.4 %	0.5 %
2013	11.7 %	0.4 %
2015	11.4 %	0.4 %
<b>2009 – 2015</b>	<b>- 12.4 %</b>	<b>(- 1.6 percentage points)</b>

Net loss of between 212,000 and 458,000 hectares of HNV farmland between 2009 and 2015 (95 % confidence interval).



# Indicator values 2009-2015

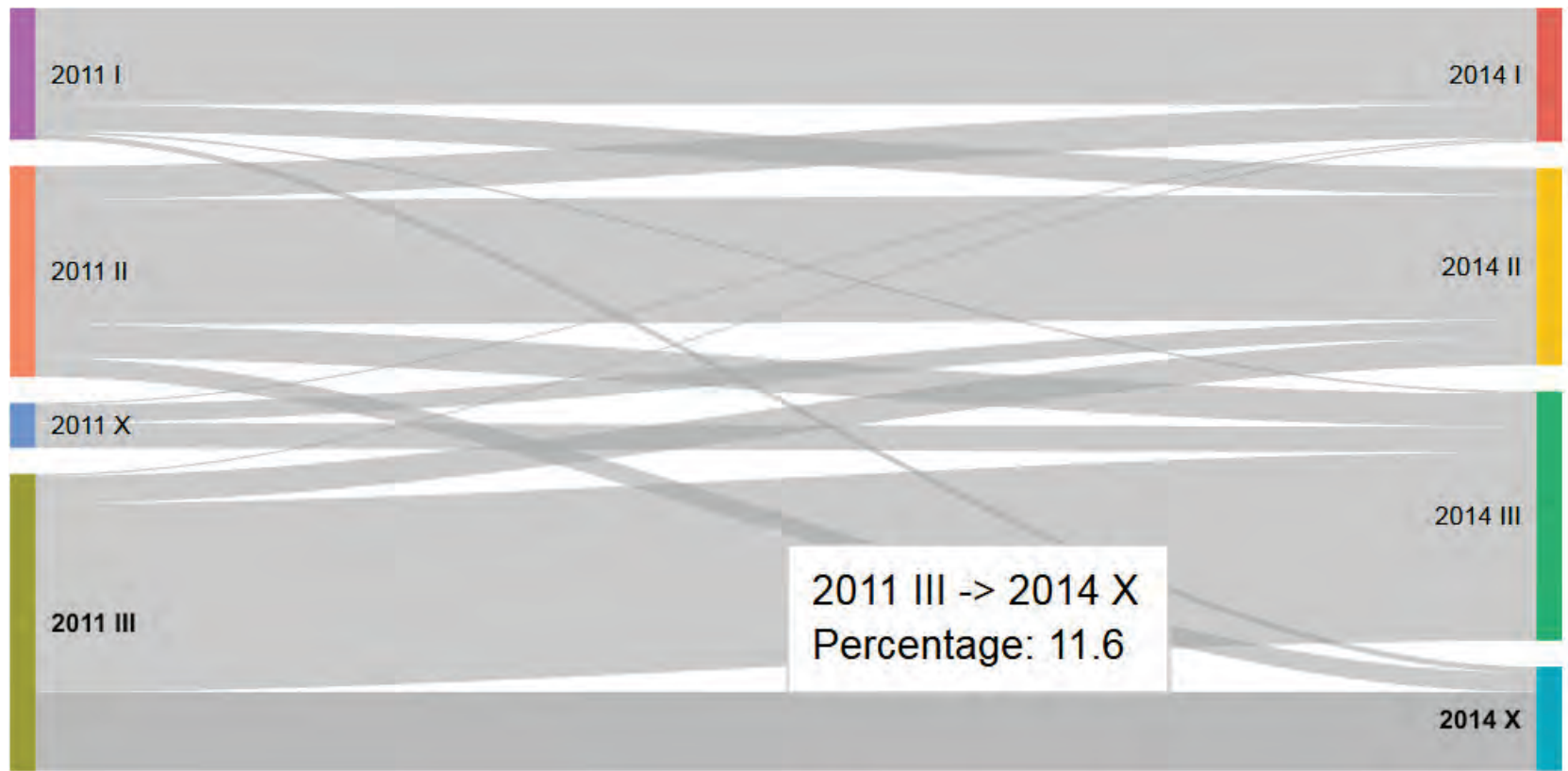
Type:	grassld.	arable	set aside	elements
2009	5.6 %	1.6 %	0.8 %	4.0%
2011	5.5 %	1.3 %	0.7 %	3.9%
2013	5.3 %	0.9 %	0.6 %	3.9%
2015	5.1 %	0.9 %	0.6 %	3.9%
	<b>-8.9 %</b>	<b>-46.0 %</b>	<b>-31.3 %</b>	<b>-2.2 %</b>



# Indicator values 2009-2015

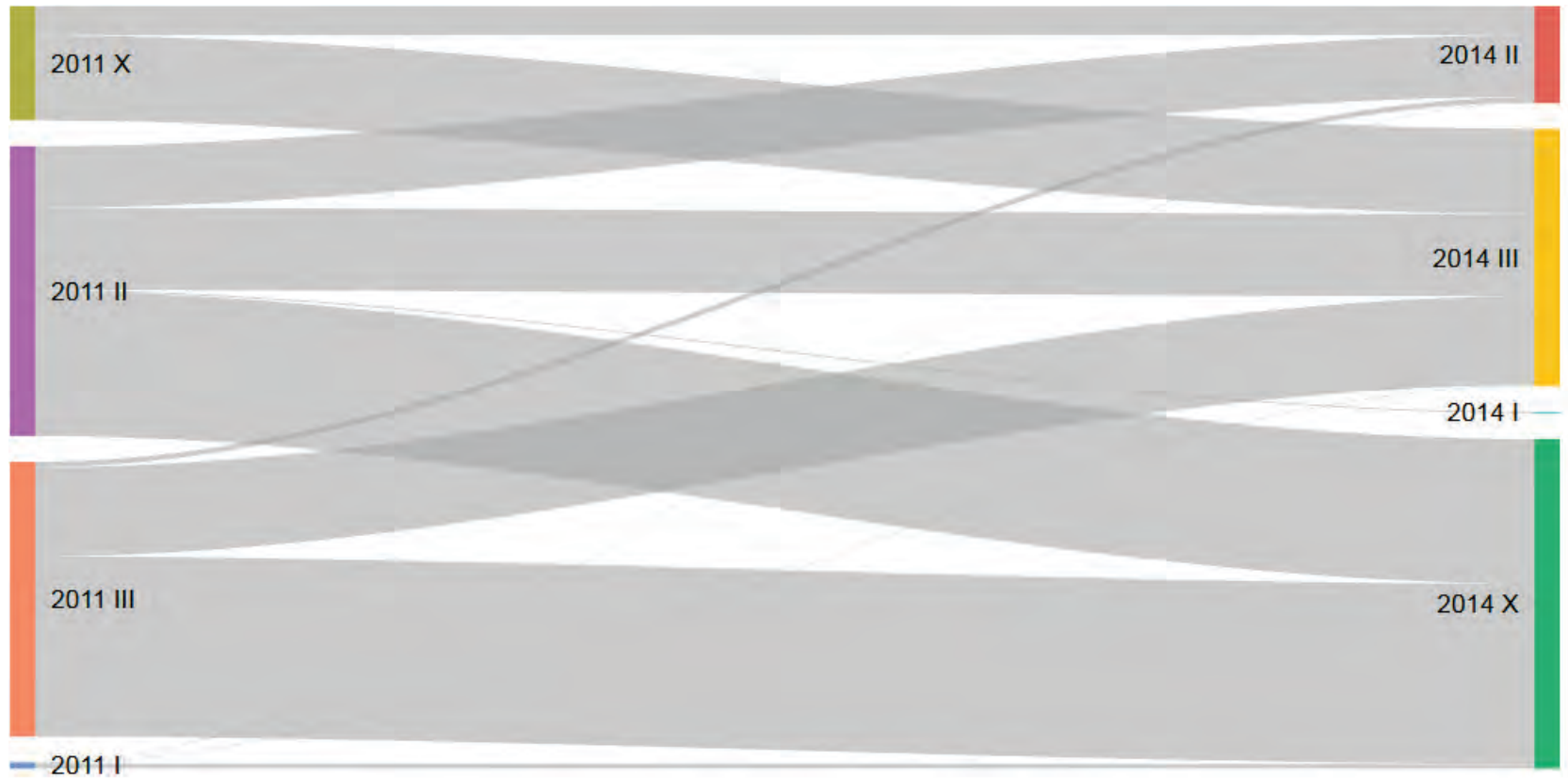
Quality:	I	II	III
2009	2.3 %	4.5 %	6.3 %
2011	2.2 %	4.4 %	5.8 %
2013	2.2 %	4.4 %	5.1 %
2015	2.2 %	4.3 %	4.9 %
	<b>-5.1 %</b>	<b>-4.0 %</b>	<b>-26.2 %</b>

# HNV grassland: quality levels





# HNV arable: quality levels



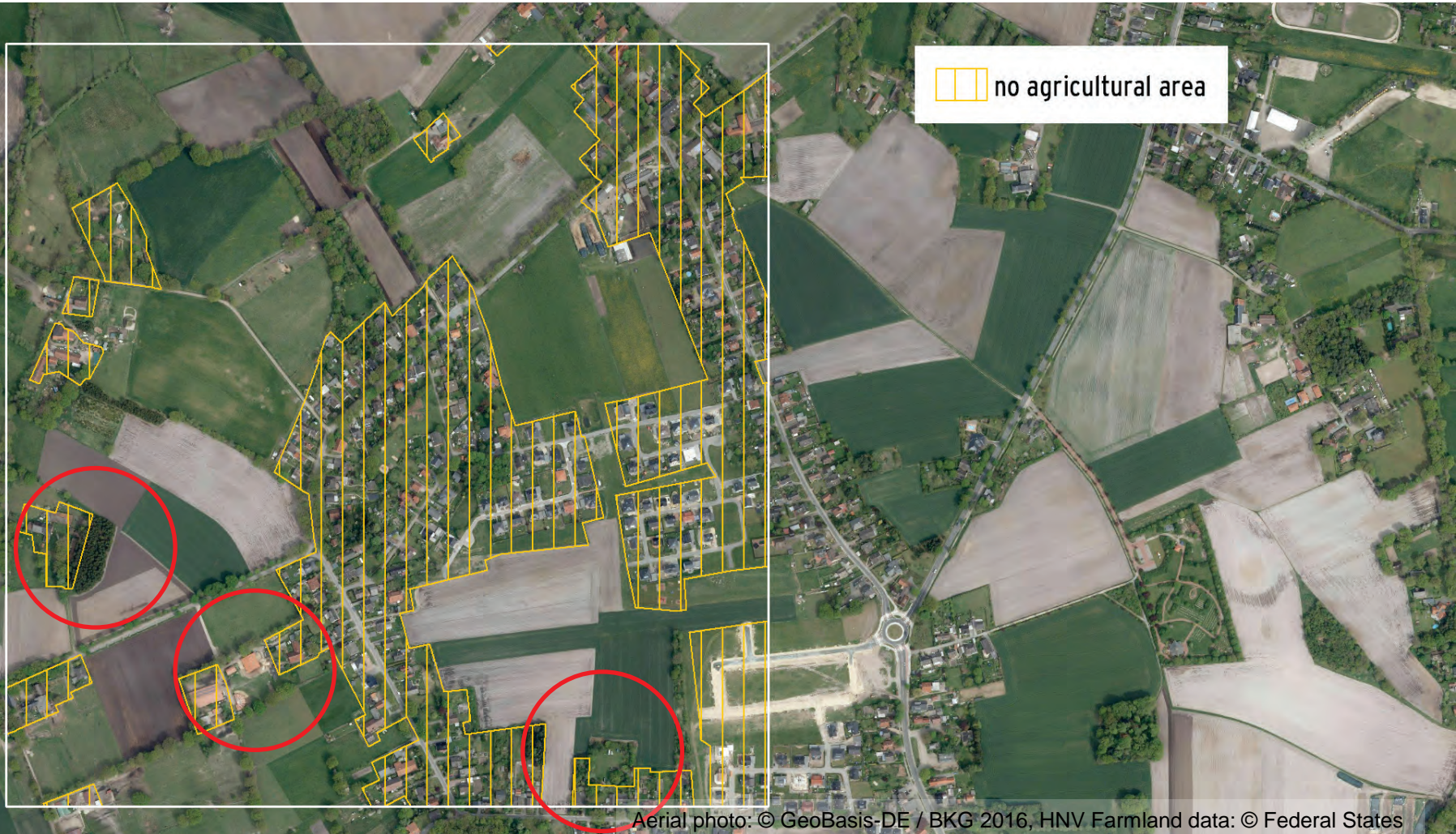
# Indicator value fed. states (NUTS 1)

Federal state	HNV 2013	s.e.	2009 / 2013
Brandenburg	16.6 %	3.0 %	-15.7 %
Baden-Württemberg	14.6 %	1.3 %	-6.5 %
Bavaria	10.2 %	1.0 %	-3.3 %
Hesse	13.5 %	1.8 %	-17.3 %
Mecklenburg-Vorp.	11.7 %	2.0 %	-13.7 %
Lower Saxony	10.0 %	1.1 %	-11.3 %
Rhineland-Palatinate	12.8 %	1.4 %	1.2 %
Schleswig-Holstein	9.3 %	1.9 %	-5.0 %
Saarland	27.3 %	5.0 %	4.6 %
Saxony	9.4 %	1.6 %	-25.1 %
Saxony-Anhalt	10.6 %	1.4 %	-21.1 %
Thuringia	16.6 %	1.3 %	0.6 %





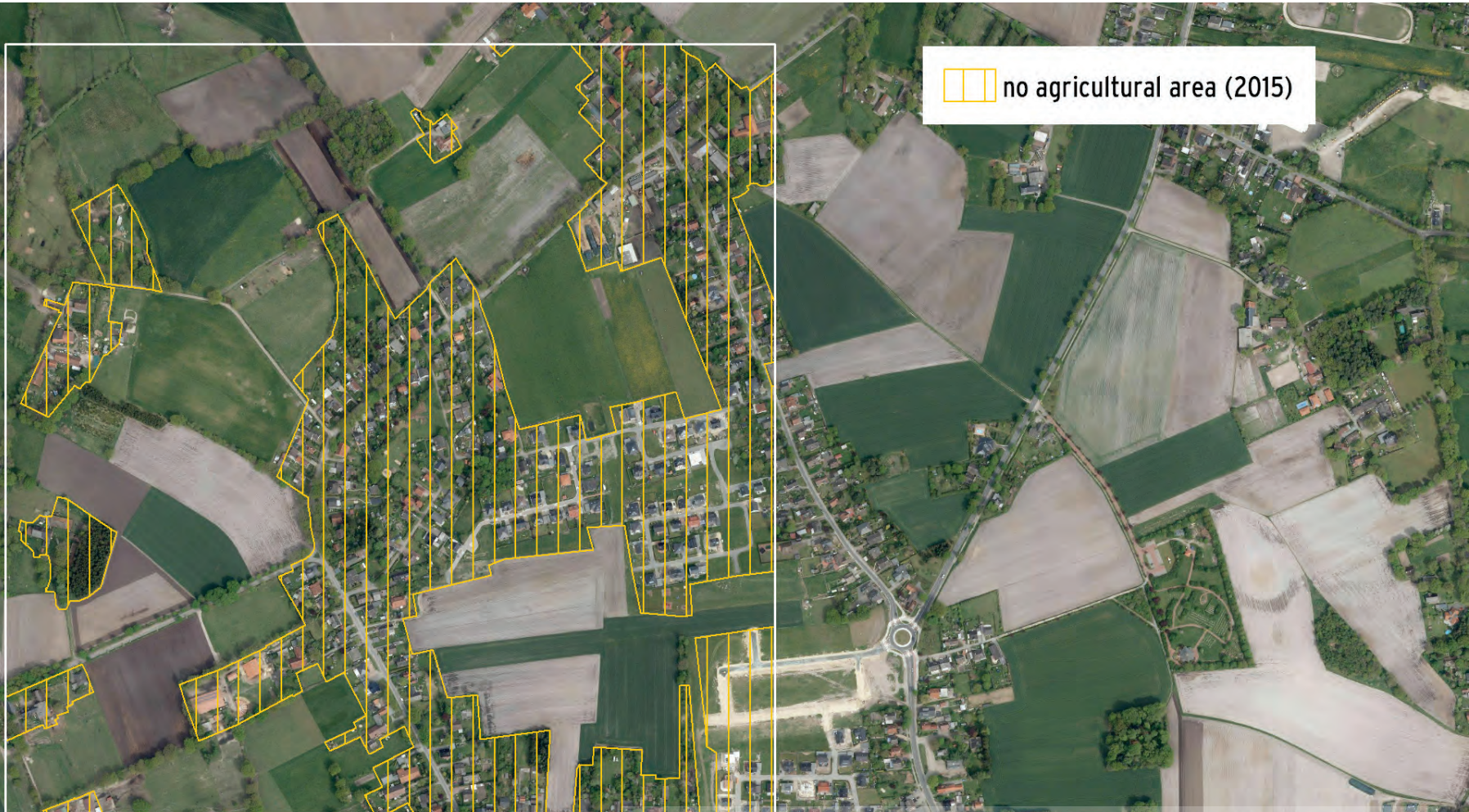
# Future prospects: agricultural area



Aerial photo: © GeoBasis-DE / BKG 2016, HNV Farmland data: © Federal States



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Aerial photo: © GeoBasis-DE / BKG 2016, HNV Farmland data: © Federal States



# Conclusions: current drawbacks

Type 3 HNV farmland probably under-represented, since in Germany some of the relevant species occur on intensely used agricultural areas (e. g. some farmland birds like bustards, geese or waders).

Direct assessment of CAP agri-environment measures at present not possible, mainly because the necessary IACS data are heavily protected by data privacy regulations.

Regional analyses on a more fine-grained scale than NUTS-1 (Federal states) not possible due to restrictions in sample size.

# Conclusions: benefits

All important criteria of current indicator fiche are fulfilled: both extent and condition of HNV farmland from 2009 onwards can be estimated annually on NUTS-0 and NUTS-1 levels.

Due to regular annual updates, changes in HNV farmland condition can be detected quickly.

By using standard statistical methods for sampling programmes, confidence levels for estimates and trends can be calculated.

The keys for mapping HNV farmland can be used on all scales, eg. for estimating HNV farmland for single holdings or smaller administrative units.

Costs are moderate in comparison with other monitoring programmes (400 to 500 € per sample plot per survey for fieldwork and preliminary data processing).