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Technical Sheet: Indicator Set 9 Avifauna



Indicator(s):

- 9.1 Bird species

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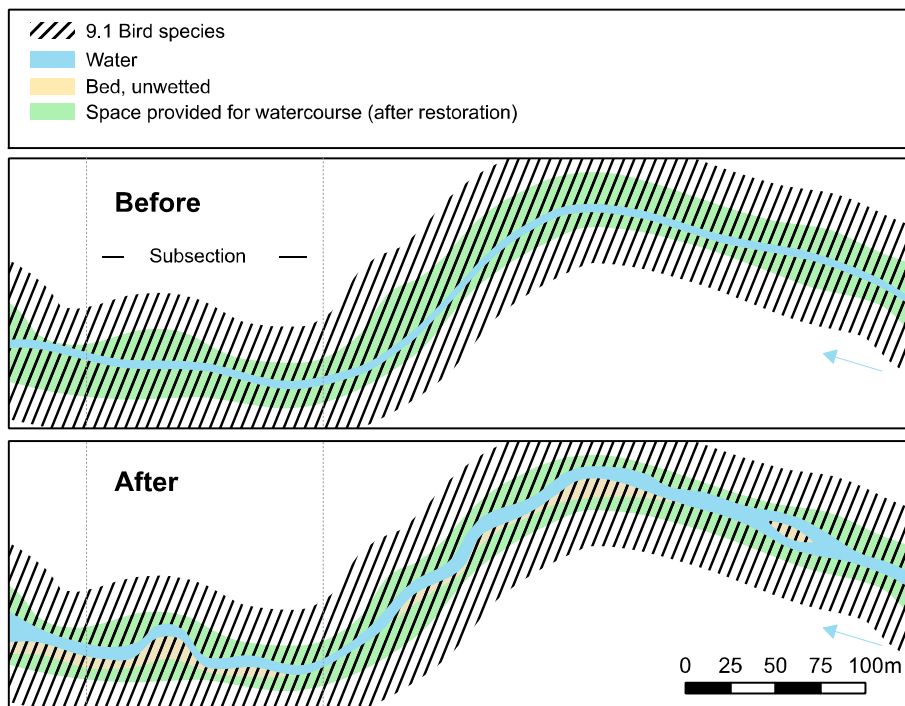
This Indicator Set forms part of the Swiss STANDARD outcome evaluation and is to be used in conjunction with the practice documentation “Evaluating the outcome of restoration projects – collaborative learning for the future” (FOEN 2019). The indicators included in the Indicator Set derive from various sources (e.g. Woolsey et al. 2005; Modular Stepwise Procedure) and, where appropriate, have been updated or adapted for the practice documentation. An overview of the most important modifications made can be found in Factsheet 7.

Principle

Riparian and floodplain habitats are an essential component of river ecosystems. The more near-natural the watercourse, the greater the diversity and quality of the habitats. The occurrence and abundance of many bird species are dependent on such habitats providing suitable nesting sites or adequate food resources. Indicator Set 9 (Avifauna) involves the mapping of breeding bird territories and determination of the number and abundance of target species before and after restoration. Target species are those bird species which are to be promoted by the restoration measures.

Parameters	The investigation covers three points relating to the status and development of avifauna: (i) number of species and territories for all breeding bird species, (ii) number of species and territories for defined target species, (iii) number of species and territories for Red List species.
Applicability	For breeding bird surveys, there are various recommendations concerning the minimum size of the habitat area to be investigated, depending on the particular question to be studied. The area should be at least large enough to allow for the occurrence of the rarest target species in a restoration project (Glutz 1962, Robbins et al. 1989). The larger the area investigated, the more meaningful the results will be. It is recommended that a minimum area of 5 ha, or a river section at least 500 m in length, should be defined for a survey.
Special considerations	The goals in relation to habitats and associated avifauna must be defined at the beginning of the restoration project. The target species which are to be promoted by the restoration measures should also be defined. The first survey visit must have taken place at low altitudes by mid-May at the latest.
Survey site	Restored section in the area provided for the watercourse, including the buffer zone (see Fig. 9.1)
Timing	At least three survey visits should take place between the end of April and the end of June – or possibly mid-July at higher elevations (e.g. in the Engadine). As a rough guideline, surveys are to be performed every 2 weeks.
Material	General survey material (see Factsheet 8), field glasses. Two copies of a map (one spare copy), list of abbreviations and criteria, GPS equipment, possibly torch.

Figure 9.1: Survey site for the indicator from Indicator Set 9.



Survey

The survey is performed using the simplified territory mapping method, with at least three survey visits (Schweizerische Vogelwarte 2006, Knaus & Schmid 2014a). This method is also used for the Breeding Bird Atlas, the Common Breeding Bird Monitoring (MHB) programme and Indicator Z7 of the FOEN Biodiversity Monitoring programme (Koordinationsstelle BDM 2014).

The individual steps involved in the survey are explained below, in chronological order.

Step	Description	Indicator
Selection of target species	<ul style="list-style-type: none"> In the project, the target species are defined which are to be promoted by the restoration measures. Recommended target species can be found in Tables 9.1 and 9.2 at the end of this document, which include details of the species' biogeographical and altitudinal distribution and habitat requirements. <p>Possible criteria for the selection of target species are:</p> <ol style="list-style-type: none"> Species typical of natural or near-natural aquatic ecosystems (including sparsely vegetated ruderal areas, tall herb stands, softwood/hardwood floodplain forest, open waters, standing water) Species typical of a particular habitat in accordance with the restoration goal Red List species Priority species for conservation efforts 	9.1
Contact with the Swiss Ornithological Institute	<ul style="list-style-type: none"> At least a month before the fieldwork, the person responsible for mapping contacts Roman Bühler from the Ornithological Institute (roman.buehler@vogelwarte.ch, 041 462 99 27) and provides the following information: <ol style="list-style-type: none"> Who is to perform the mapping (e-mail address of the ornitho.ch account)? Several mappers may be involved. Within what perimeter is the mapping to take place? Ideally, a GIS file of the restoration project perimeter (including buffer zone*) should be submitted. <p>*It is recommended that a buffer zone extending 50–100 m around the project perimeter should be defined and included in the surveys. When territory delineation is performed, it can then be determined whether an uncertain territory lies inside or outside the project perimeter.</p> The Ornithological Institute undertakes the background work required to ensure that the data can be digitalised and analysed with Terrimap Online (http://tmo.vogelwarte.ch). The Ornithological Institute contacts the mappers and instructs them on the procedure for fieldwork: dispatch of paper field maps (daily maps), instructions for the use of Terrimap Online, and for mapping and territory delineation. 	9.1
Definition of the survey route	<ul style="list-style-type: none"> The person responsible for mapping defines the route for the survey visit. The route should be defined in such a way as to cover the essential parts of the area under investigation. After restoration, the route may need to be slightly modified. 	9.1
Walkover surveys	<ul style="list-style-type: none"> Three survey visits are performed in the early hours of the morning (see above for timing and frequency). In the case of large watercourses, it may not be possible to cover both banks in one morning – i.e. two walkovers per time point may be required. The first survey visit must be completed at low elevations by mid-May at the latest. During each walkover, all birds heard or sighted in an “auditory observation corridor” approx. 50 m wide are recorded on the daily maps received from the Ornithological Institute.¹ 	9.1

Digitalisation of survey data and territory delineation	<ul style="list-style-type: none"> The completed daily maps are copied, scanned or photographed in adequate quality (back-up copy for mappers). The daily maps are digitalised by the mappers using Terrimap Online, according to the instructions provided by the Ornithological Institute. The Ornithological Institute reviews the digitalised daily map. Data rectification, including validation by the Swiss Ornithological Institute, takes place by the end of the year at the latest (or earlier on request). After completion of the control, the results (ZIP file with species maps, GIS data and precinct table), e.g. for interim reports or invoices from private offices, can be downloaded within Terrimap Online (save icon in the precinct view). 	9.1
Data submission to federal authority	<ul style="list-style-type: none"> Using the results downloaded directly from Terrimap Online (after control by the ornithological station!), the data entry form for Indicator Set 9 (Avifauna) can be completed by the person responsible for mapping. This form is submitted to the federal authority, together with the results downloaded from Terrimap Online (entire ZIP file), as part of the data submitted for restoration project outcome evaluation. 	9.1

¹Explanatory note for surveys (from Schweizerische Vogelwarte 2006, see also Knaus & Schmid 2014a and b): A territory is assumed to exist if at least one of the following conditions is met (with three walkover surveys):

- Breeding evidence, i.e. nest with adult incubating, eggs or young, or eggshells from nestlings; adult feeding or removing a fecal sac; distraction display by adult; recently fledged young.
- Individual displaying territorial behaviour (male singing or engaged in courtship display, also – in certain species such as warblers – intense warning calls near the nest) or intraspecific same-sex aggression recorded during one walkover.
- Two grouped records not involving display of territorial behaviour. This criterion relates to species whose song is not particularly complex or conspicuous, or to species with group territories, such as the Long-tailed Tit, Spotted Flycatcher, White Wagtail or Eurasian Tree Sparrow.

Evaluation

The assessment approaches presented below have been newly developed for STANDARD outcome evaluation and serve as a guide. They will be revised in the coming years, based on experience gained with STANDARD outcome evaluation. It is difficult to determine a reference state for avifauna, as bird distribution patterns can be decisively influenced, depending on the species, by habitats around the project perimeter, existing populations and other temporal and spatial factors. For this reason, the assessment is based on existing data from restoration projects.

9.1 Bird species	<p>The evaluation of the indicator is divided into three dimensions: 1. species diversity, 2. target species and 3. density. The value of the avifauna indicator results from the sum of these three dimensions, calculated from the raw data. The evaluation is adapted to all biogeographical regions and altitudinal levels in Switzerland where data on the avifauna of restoration projects are currently available (see Table 9.1). As soon as data are available at alpine level, the assessment will be adapted.</p> <p><u>1. Species diversity</u> This dimension evaluates the change in species diversity in the watercourse habitat and all other (transitional) habitats within the surveyed project perimeter. Species diversity (i.e. the number of breeding bird species within the project perimeter surveyed) is assessed in comparison with existing data on the number of breeding bird species in restoration projects. The evaluation is linear, and the higher the number of breeding bird species, the higher the value of this dimension. Species diversity is weighted at 35% for the evaluation of the avifauna indicator.</p> <p><u>2. Target species</u> This dimension evaluates the change in target species within the project perimeter. Target species (i.e. the number of target species nesting within the surveyed project perimeter) are evaluated on a linear scale from 0 to max. number of target species. The higher the number of target species, the higher the value of this dimension. Target species are weighted at 50% for the avifauna indicator.</p> <p><u>3. Density</u> This dimension evaluates the change in breeding bird density within the perimeter of the surveyed project. Density (i.e. the number of breeding bird territories per hectare nesting within the project perimeter) is assessed by comparison with existing data on breeding bird density in revitalization projects. The evaluation is linear, and the higher the density, the higher the value of this dimension. The density is weighted at 15% for the evaluation of the avifauna indicator.</p>
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Time required

Table 9.3: Estimated time required in person-hours for the determination and evaluation of Indicator Set 9. General items (e.g. travel time for fieldwork) are not taken into account. A rough cost estimate can be found in Table 2.1 of Factsheet 2.

Step	Specialists		Assistants	
	Persons	Time per person (h)	Persons	Time per person (h)
Preparation	1	2–3		
Breeding bird mapping surveys	1	9–12		
Digitalisation of survey	1	2–3		
Total person-hours	13–18			

Notes: The time required per mapping will vary according to bird density and the accessibility of the terrain. For bird-rich lowland sample areas, it will be approx. 5–15 minutes per hectare, and on open farmland approx. 2 minutes per hectare.

Further information

- Data arising
- Data entry form Indicator Set 9: KT_ProCode_ERHEBUNG_Set9_V#.xls
 - Export file (ZIP) from Terrimap Online (downloadable by clicking the save button in the Terrimap Online precinct view). Rename file to "KT_ProCode_Collection_Set9_TMOdata".
- Elements of the file naming scheme (see Factsheet 5):
- KT = two-capital-letter cantonal abbreviation (e.g. BE)
 - ProCode = project code
 - ERHEBUNG = survey time point, i.e. VORHER (= before), NACHHER1 (= after 1), NACHHER2 (= after 2), or VERTIEFT (= EXTENDED)
 - V# = version number of the data entry form

Attachments

The data entry form and other tools can be downloaded at:
<https://www.bafu.admin.ch/wirkungskontrolle-revit>

List of changes

Relevant changes since the last version are marked in green.

Date (mm/yy)	Version	Changes	Responsibility
4/2020	1.02	Correction of spelling mistakes, small conceptual adjustments	Eawag
4/2020	1.02	Minor graphical adjustments	Eawag
1/2023	1.03	Correction of typographical errors, addition of author team at time of first observation, conceptual adjustments and clarifications, update of Red List.	Eawag
3/2024	1.04	The contact person at the Ornithological station is now Roman Bühler.	Eawag
12/2024	1.05	Addition with new evaluation, adaptation of table 9.1.	Vogelwarte

Table 9.1: Non-exhaustive list of possible target species and their geographical (biogeographical regions in accordance with FOEN 2022) and altitudinal distribution (ordered systematically). Bold type indicates species of non-human-modified watercourses (Spaar & Pfister 2000), which occur almost exclusively on natural and near-natural watercourses or are primarily concentrated in these habitats. Other species included in this Table are the Garden Warbler, Common Nightingale and Golden Oriole (species of near-natural forests, which are part of natural or near-natural aquatic ecosystems), as well as the Goosander and Collared Sand Martin.

	Jura	Central Plateau	North side of the Alps	Western Central Alps	Eastern Central Alps	South side of the Alps
Colline	<ul style="list-style-type: none"> - Goosander - Common Sandpiper - Common Kingfisher - Collared Sand Martin - Grey Wagtail - White-throated Dipper - Common Nightingale - Garden Warbler - Golden Oriole 	<ul style="list-style-type: none"> - Goosander - Little Ringed Plover - Common Sandpiper - Common Kingfisher - Collared Sand Martin - Grey Wagtail - White-throated Dipper - Common Nightingale - Garden Warbler - Golden Oriole 	<ul style="list-style-type: none"> - Goosander - Little Ringed Plover - Common Sandpiper - Common Kingfisher - Collared Sand Martin - Grey Wagtail - White-throated Dipper - Common Nightingale - Garden Warbler - Golden Oriole 	<ul style="list-style-type: none"> - Goosander - Little Ringed Plover - Common Sandpiper - Common Kingfisher - Grey Wagtail - White-throated Dipper - Common Nightingale - Garden Warbler - Golden Oriole 	<ul style="list-style-type: none"> - Goosander - Little Ringed Plover - Common Sandpiper - Common Kingfisher - Grey Wagtail - White-throated Dipper - Common Nightingale - Garden Warbler - Golden Oriole 	<ul style="list-style-type: none"> - Goosander - Little Ringed Plover - Common Sandpiper - Common Kingfisher - Grey Wagtail - White-throated Dipper - Common Nightingale - Garden Warbler - Golden Oriole
Montane	<ul style="list-style-type: none"> - Goosander - Common Sandpiper - Common Kingfisher - Grey Wagtail - White-throated Dipper - Garden Warbler - Golden Oriole 	<ul style="list-style-type: none"> - Goosander - Little Ringed Plover - Common Sandpiper - Common Kingfisher - Grey Wagtail - White-throated Dipper - Garden Warbler - Golden Oriole 	<ul style="list-style-type: none"> - Goosander - Little Ringed Plover - Common Sandpiper - Common Kingfisher - Grey Wagtail - White-throated Dipper - Garden Warbler - Golden Oriole 	<ul style="list-style-type: none"> - Goosander - Little Ringed Plover - Common Sandpiper - Common Kingfisher - Grey Wagtail - White-throated Dipper - Garden Warbler - Golden Oriole 	<ul style="list-style-type: none"> - Goosander - Little Ringed Plover - Common Sandpiper - Common Kingfisher - Grey Wagtail - White-throated Dipper - Garden Warbler - Golden Oriole 	<ul style="list-style-type: none"> - Goosander - Little Ringed Plover - Common Sandpiper - Common Kingfisher - Grey Wagtail - White-throated Dipper - Garden Warbler - Golden Oriole
Subalpine			<ul style="list-style-type: none"> - Little Ringed Plover - Common Sandpiper - Grey Wagtail - White-throated Dipper - Garden Warbler 	<ul style="list-style-type: none"> - Little Ringed Plover - Common Sandpiper - Grey Wagtail - White-throated Dipper - Garden Warbler 	<ul style="list-style-type: none"> - Little Ringed Plover - Common Sandpiper - Grey Wagtail - White-throated Dipper - Garden Warbler 	<ul style="list-style-type: none"> - Little Ringed Plover - Common Sandpiper - Grey Wagtail - White-throated Dipper - Garden Warbler
Alpine			<ul style="list-style-type: none"> - Grey Wagtail - White-throated Dipper 	<ul style="list-style-type: none"> - Grey Wagtail - White-throated Dipper 	<ul style="list-style-type: none"> - Grey Wagtail - White-throated Dipper 	<ul style="list-style-type: none"> - Grey Wagtail - White-throated Dipper

Table 1: Jura (colline): 9 target species

Table 2: Central Plateau, North side of the Alps (colline): 10 target species

Table 3: Western Central Alps, Eastern Central Alps, South side of the Alps (colline): 9 target species

Table 4: Jura (montane): 7 target species

Table 5: Central Plateau, North side of the Alps, Western Central Alps, Eastern Central Alps, South side of the Alps (montane): 8 target species

Table 6: Subalpine: 6 target species

Table 9.2: Ecological characterisation of the recommended target species of natural and near-natural aquatic ecosystems (ordered systematically). Bold type indicates species which occur almost exclusively on natural and near-natural watercourses or are primarily concentrated in these habitats. Detailed information on individual species is available at: <https://www.vogelwarte.ch/en/birds/birds-of-switzerland/>. * The List of National Priority Species is soon going to be revised.

Species name	Indicates the presence of the following habitat structures:	Habitat (classified in accordance with Delarze et al. 2015)	Preferred watercourse size (small, medium-sized, large)	Red List status, as of 2021	National Priority Species status, as of 2017*
Goosander	Natural cavities in rocks and trees (nesting sites)	1, 1.1, 1.2, 3, 3.4, 6, 9, 9.2	Medium-sized, large	Near threatened	Priority 2
Little Ringed Plover	Sparsely vegetated gravel, sand and silt islands and banks	1, 1.2, 3, 3.2	Medium-sized, large	Endangered	Priority 1
Common Sandpiper	Gravel, sand and silt banks largely composed of fine sediment, and pioneer vegetation	1, 1.2, 2, 2.0, 2.1, 5, 5.3, 6, 6.1	Medium-sized, large	Endangered	Priority 1
Common Kingfisher	Abundant perching sites, steep eroded banks	1, 1.1, 1.2, 2, 2.1, 3, 3.2, 6, 6.1	Small, medium-sized, large	Vulnerable	Priority 1
Collared Sand Martin	Sandy/gravelly steep faces	2, 2.0, 3, 3.2	Medium-sized, large	Endangered	Priority 1
Grey Wagtail	Streams with gravelly or rocky banks	1, 1.1, 1.2, 2, 2.0, 2.1, 3, 3.2, 5, 5.1, 5.3, 6, 6.1, 6.3, 9, 9.2	Small, medium-sized, large	Least concern	-
White-throated Dipper	Watercourses of all kinds with relatively clean water, availability of nesting sites directly above the water or behind waterfalls	1, 1.1, 1.2	Small, medium-sized, large	Least concern	Priority 3
Common Nightingale	Rich, dense undergrowth	5, 5.3, 6, 6.1, 6.3	Small, medium-sized, large	Least concern	Priority 2
Garden Warbler	Woodland with dense shrubs, especially on damp ground	5, 5.3, 6, 6.1, 6.2, 6.3	Small, medium-sized, large	Vulnerable	Priority 2
Golden Oriole	Highly structured, sparse stands with tall single trees	6, 6.1, 6.2, 6.3	Medium-sized, large	Least concern	-