Census, Survey and Monitoring Schemes of Forest Birds

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Outline

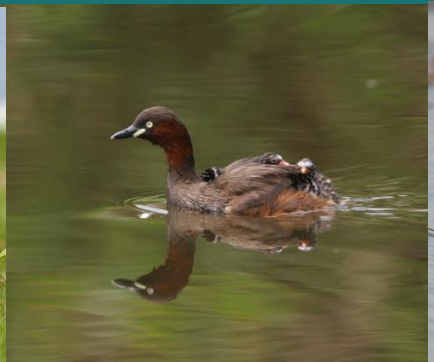
- 鸟类数量调查与监测的意义
- 国外重要案例BBS介绍
- 常用调查与监测方法




1．鸟类数量调查与监测的意义

- 引人注目、分布广泛和比较容易鉴别；
- 分布、自然史和系统分类等比较清楚；
- 高质量的鸟类野外识别手册；
- 数量众多的专业人员与具很强识别能力的业余爱好者；






- 对栖息地和环境变化反应极为敏感；
- 直接反映栖息地的适宜性、生态系统健康与生物多样性状况；
- 重要的环境影响评价和生物多样性评估与监测指标；
- 鸟类种类组成与数量调查及其动态的长期监测在国外已有100多年的历史。

Cases:

- CBC（the Christmas Bird Count）：1900~，北美，National Audubon Society；
- BBS（the Breeding Bird Survey）：1965~，北美，United States Fish and Wildlife Service；

Christmas Bird Count Circles in the Western Hemisphere

- CBC（Common Birds Census）：1962~，英国，BTO；
- BBS（Breeding Bird Survey）： 1994~，英国， BTO/JNCC/RSPB；
- PECBM（Pan-European Common Bird Monitoring Project）：2002~，欧洲，EBCC（the European Birds Census Council）.

部分正在欧洲实施的陆地鸟类监测计划

国家 Country	项目名称 Scheme name	起始年份 Start	调查方法 Method
芬兰 Finland	芬兰繁殖鸟类年度监测 Annual monitoring of breeding birds in Finland	1975	P & L
瑞典 Sweden	瑞典繁殖鸟类调查 Swedish Breeding Bird Survey	1975	P
丹麦 Denmark	繁殖与越冬鸟的样点法普查 Point count census of breeding and wintering birds	1976	P
捷克 Czech Republic	繁殖鸟类普查计划 Breeding Bird Census Programme	1981	P
爱沙尼亚 Estonia	样点法普查计划 Point census project	1983	P
荷兰 Netherlands	常见繁殖鸟类调查计划 Common breeding species project	1984	T
法国 France	常见鸟类调查 Temporal Survey of Common Birds	1989	P
德国 Germany	德国鸟类学家联合会常见繁殖鸟类监测计划 Dachverband Deutscher Avifaunisten Monitoring programm Häufige Brutvögel	1989	P, L & T
比利时 Belgium	瓦隆尼亚常见繁殖鸟类调查 Common Breeding Birds Survey in Wallonia	1990	P

立陶宛 Lithuania	立陶宛繁殖鸟类监测计划 Lithuanian Breeding Bird Monitoring Scheme	1991	P
英国 United Kingdom	繁殖鸟类调查 Breeding Bird Survey	1994	L
挪威 Norway	挪威繁殖鸟类普查 Norwegian Breeding Bird Census	1995	P
西班牙 Spain	常见繁殖鸟类监测计划 Common Breeding Bird Monitoring Scheme	1996	P
奥地利 Austria	奥地利繁殖鸟类调查 Monitoring der Brutvögel Österreichs	1998	P
爱尔兰 Ireland	乡村鸟类调查 Countryside Bird Survey	1998	L
匈牙利 Hungary	常见鸟类监测 Monitoring of our common birds	1999	P
瑞士 Switzerland	繁殖鸟类数量监测 Monitoring of abundance breeding birds	1999	T
意大利 Italy	意大利鸟类监测 Monitoraggio Italiano Ornitologico	2000	P
波兰 Poland	常见繁殖鸟类监测计划 Common Breeding Bird Monitoring Scheme	2000	L
保加利亚 Bulgaria	常见鸟类监测计划 Common Bird Monitoring Scheme	2004	L
葡萄牙 Portugal	常见鸟类普查 Common Bird Census	2004	P

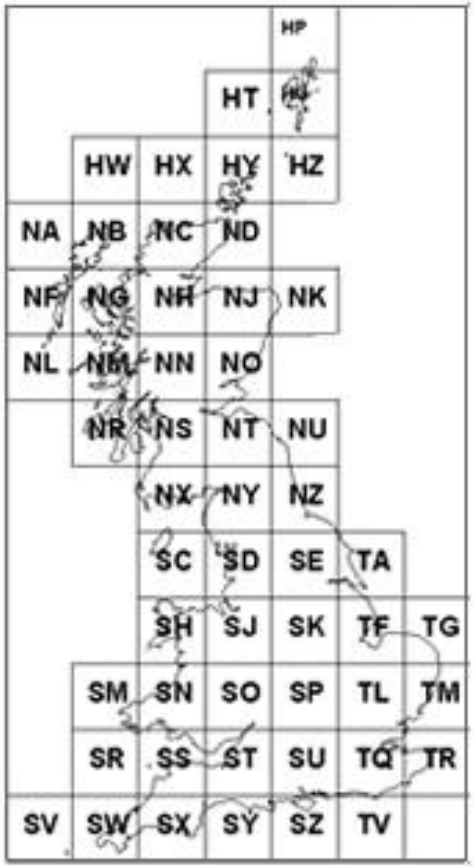
P: 样点法; L: 样线法; T: 标图法

P, Point transects; L, Line transects; T, Territory mapping

2. 国外重要案例(BBS)介绍

- **BBS survey in UK**
- Squares are randomly selected from a list of all 1-km squares in the National Grid, excluding coastal squares with less than 50% land
- Volunteers
- Stratified random sampling

Figure 1



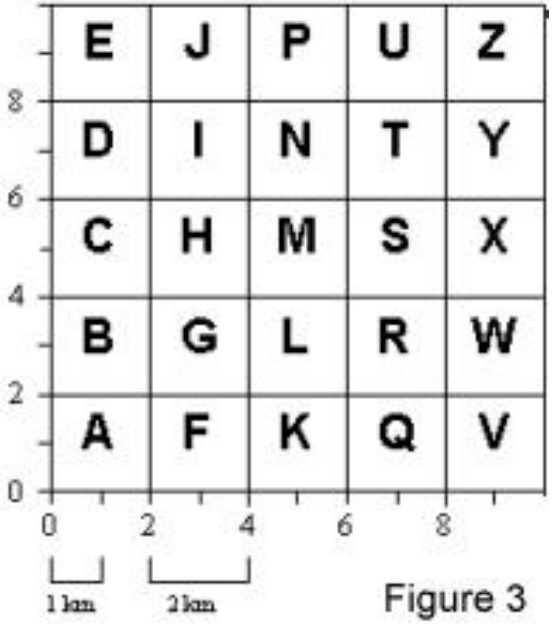
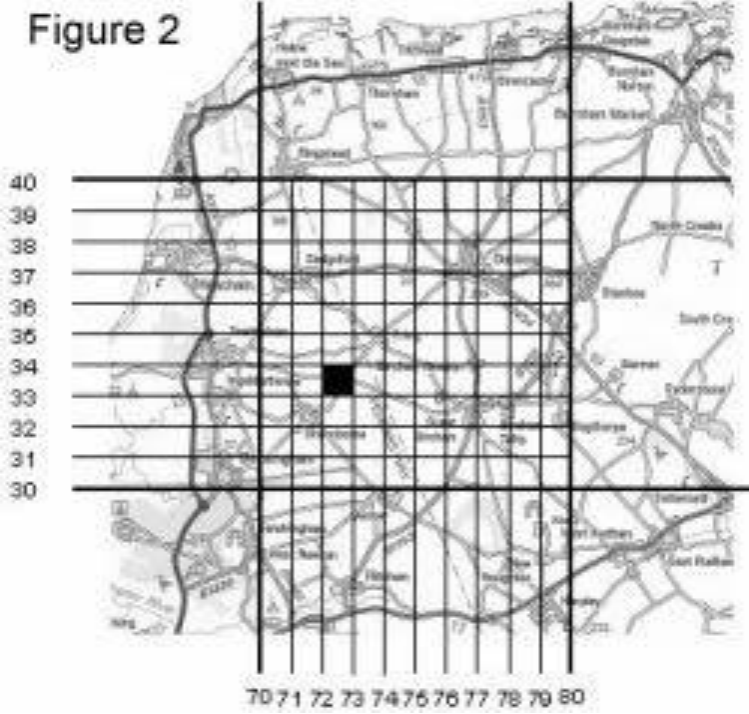
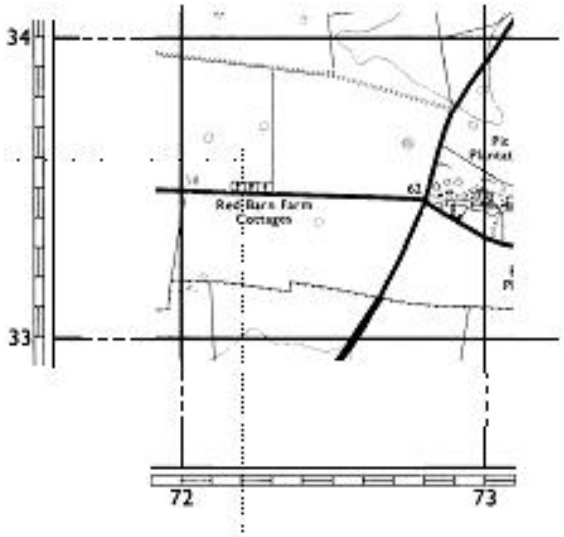


Figure 3

Figure 2





BBS Breeding Bird Survey

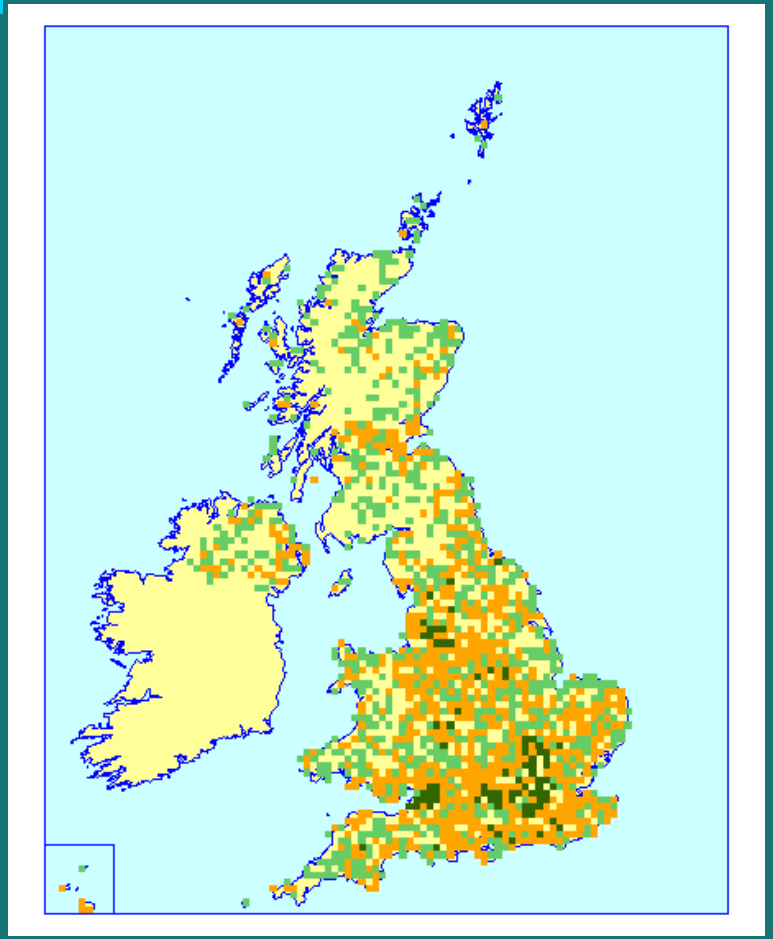
JOINT NATURE CONSERVATION COMMITTEE RSPB BTO

- The ideal survey route comprises two parallel lines
- each 1km in length, about 500m apart, and about 250m from the edge of the square
- Transects are divided into 200m sections, making a total of ten 200m sections per square

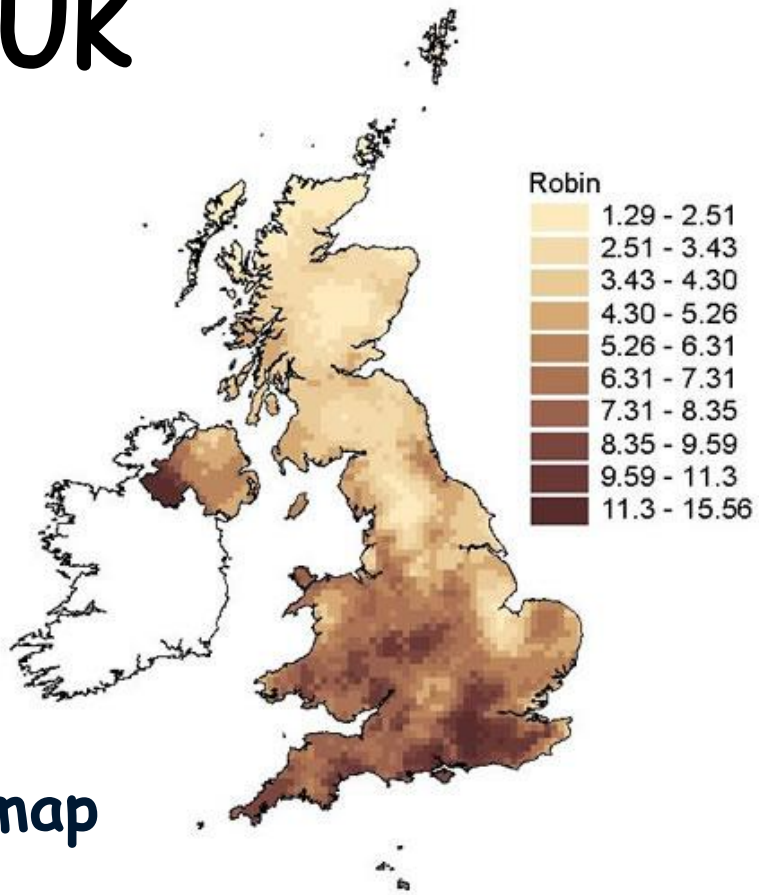
- Bird counts are carried out on the second and third visits
- Three distance categories:
- within 25m,
- between 25-100m,
- over 100m

BBS squares surveyed in 2007

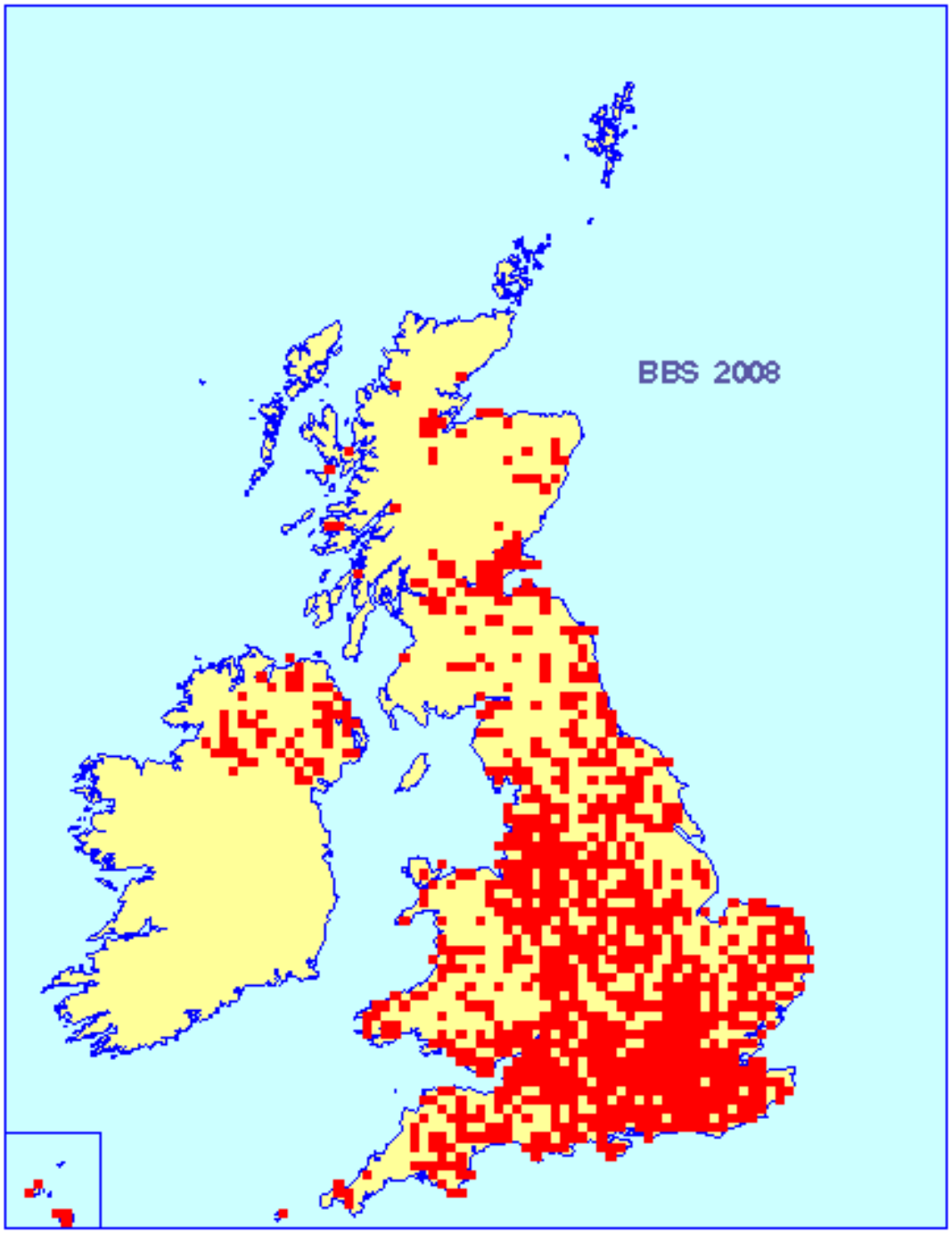
- Number of 1km BBS grid squares surveyed in 2007
- Light Green = 1 BBS square in this 10km sqaure.
  Orange = between 2 and 5.
  Dark Green = more than 5.



Robin in the UK



- The colours on the map show relative abundance in 2003, with darker colours indicating more birds.



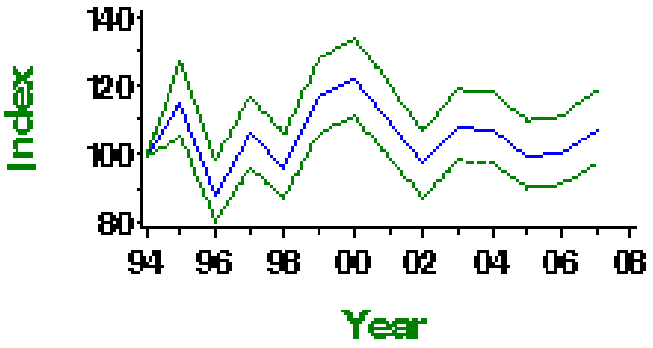
Great Tit
Parus major

Animation of yearly distribution

1994~2008

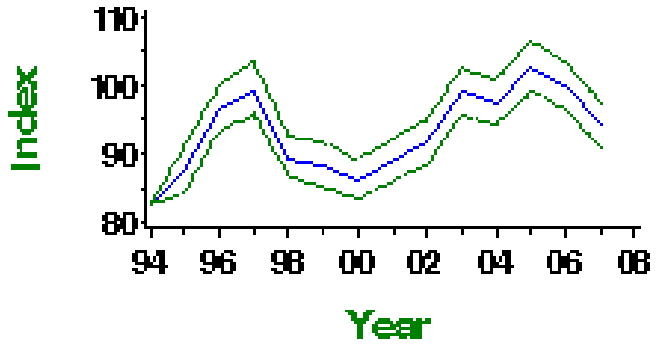
BBS index for UK 1994–2007

Long-tailed Tit



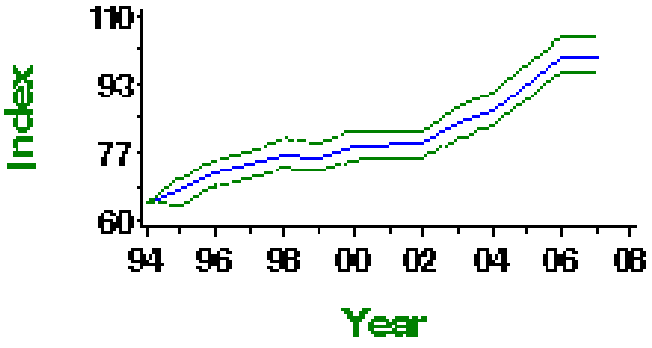
BBS index for UK 1994–2007

Blue Tit



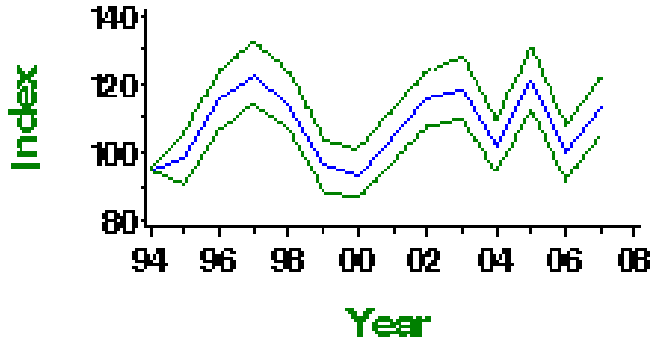
BBS index for UK 1994–2007

Great Tit



BBS index for UK 1994–2007

Coal Tit



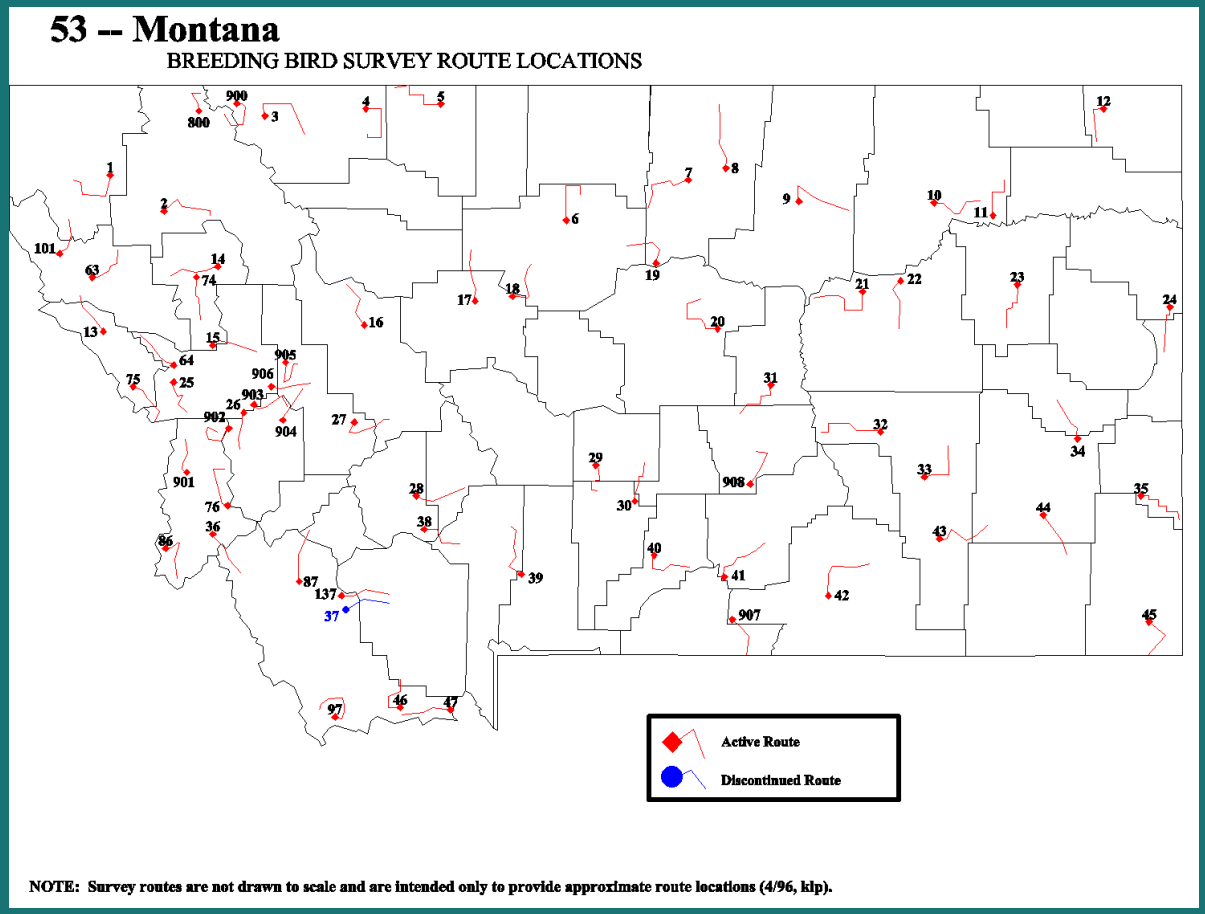
BBS in North American

- USGS Patuxent Wildlife Research Center and the Canadian Wildlife Service, National Wildlife Research Center
- Formally launched in 1966;
- Collect bird population data along roadside survey routes;
- Over 4100 survey routes are located across the continental U.S. and Canada

- Each survey route: 24.5 miles with stops at 0.5-mile intervals;
- At each stop, a 3-minute point count is conducted;
- During the count, every bird seen within a 0.25-mile radius or heard is recorded;

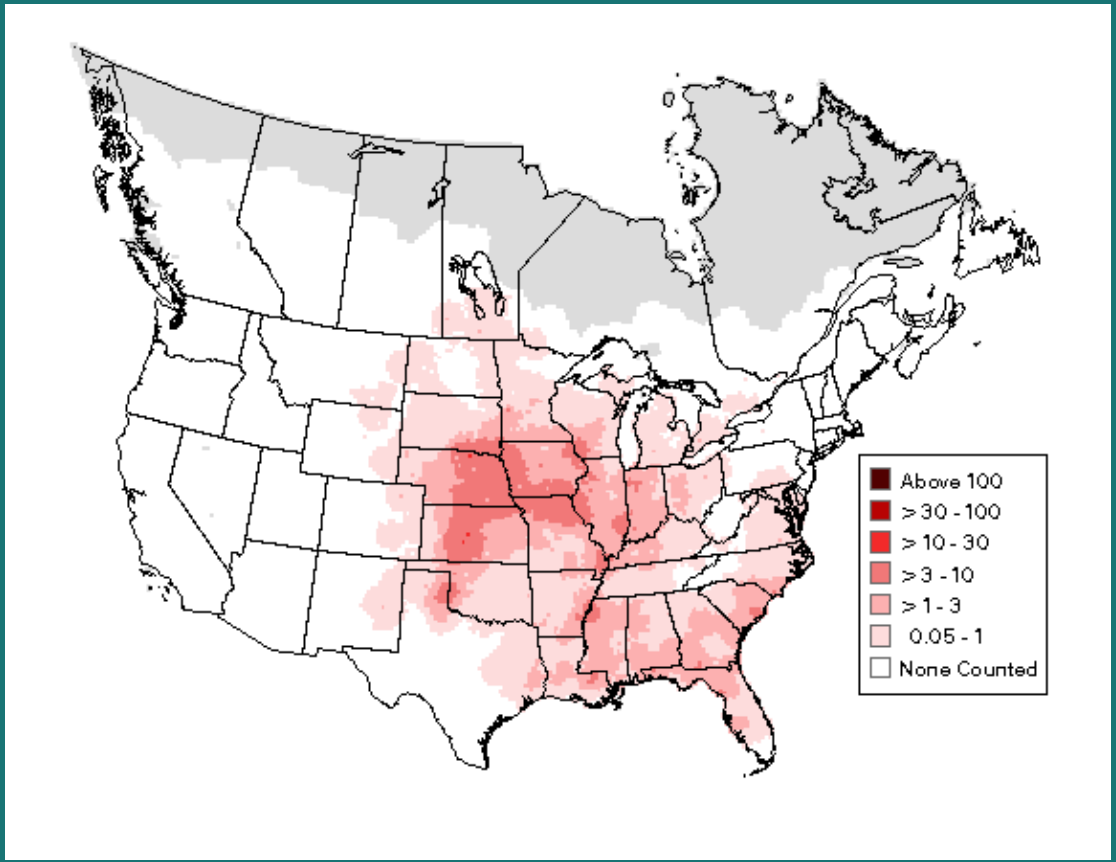
- BBS data provide an index of population abundance that can be used to estimate population trends and relative abundances at various geographic scales.
- Trend estimates for more than 420 bird species and all raw data are currently available via the BBS web site.

Case of survey routes in Montana, US



Cases of results:
Red-headed Woodpecker

- Summer Distribution Map
- 1994 - 2003



North American Breeding Bird Survey

USGS Patuxent Wildlife Research Center

Environment Canada Canadian Wildlife Service

Environnement Canada Service canadien de la faune

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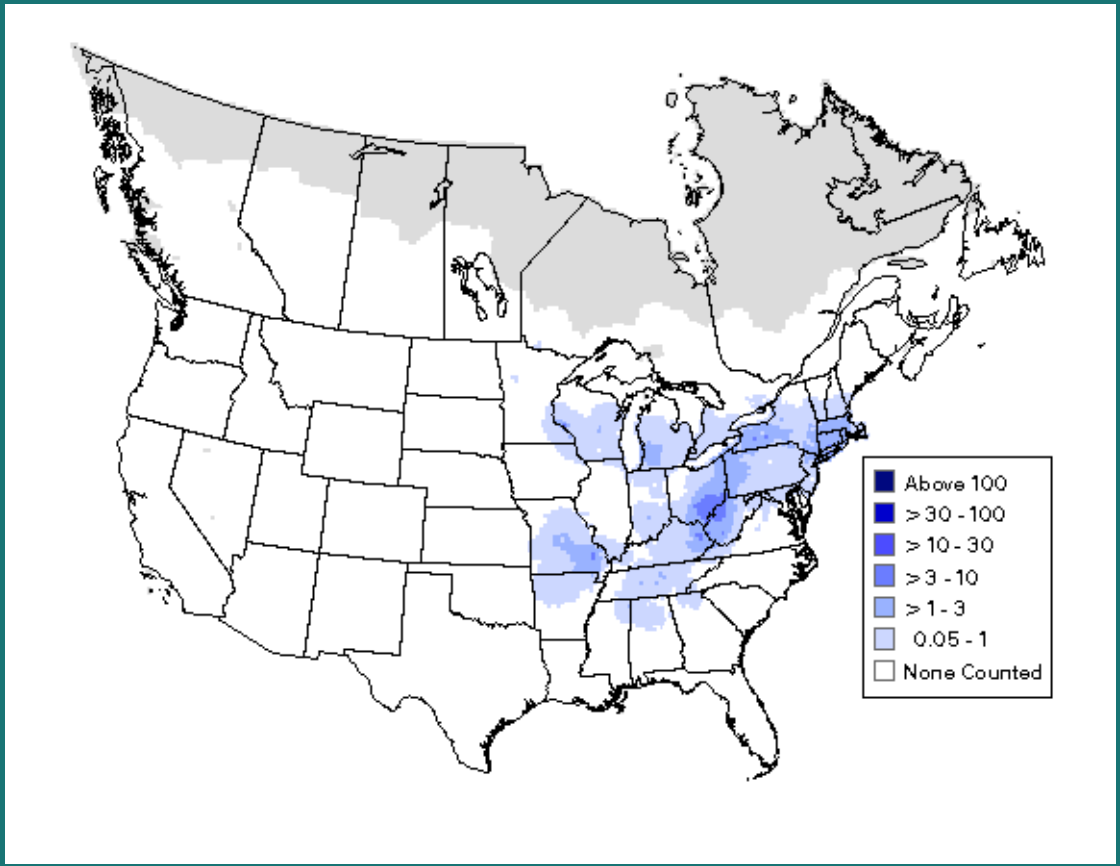
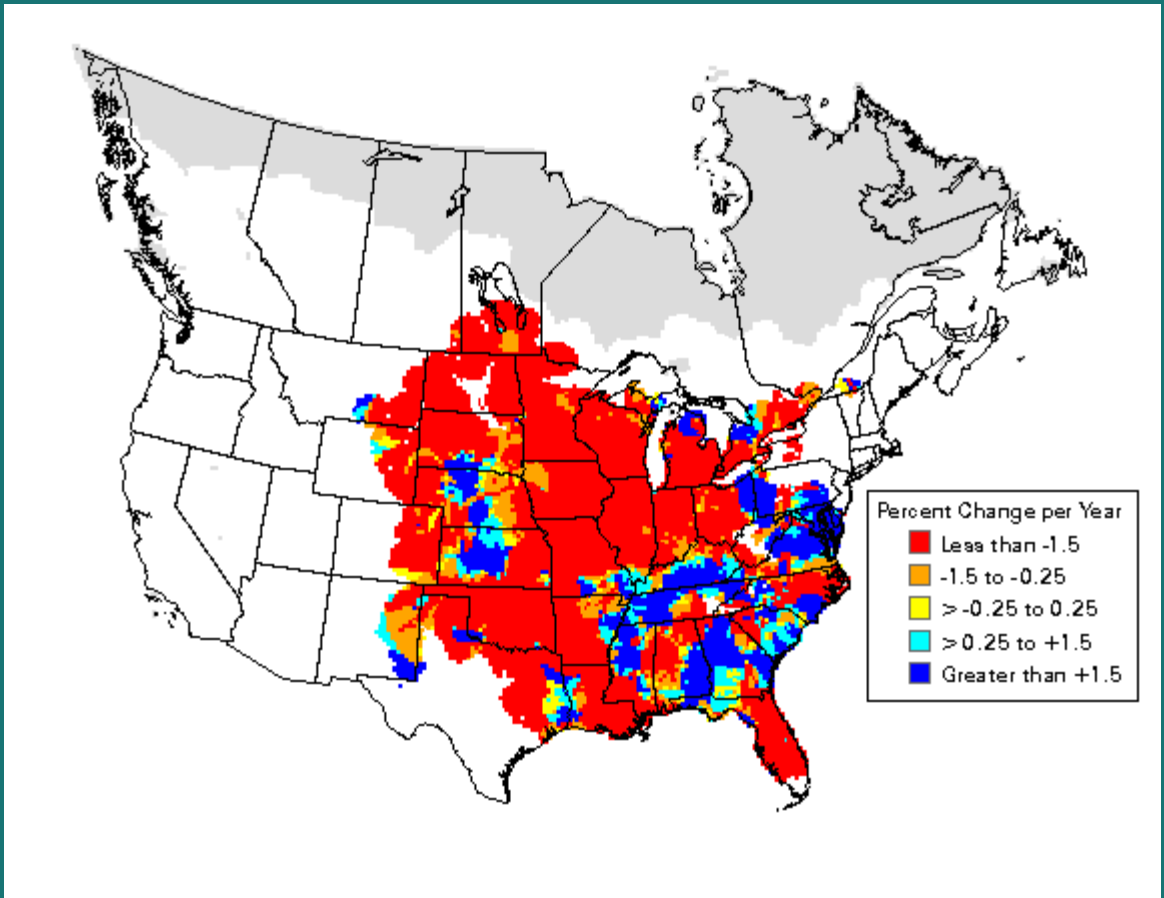
Blue-winged Warbler *Vermivora pinus*

- Summer Distribution Map
- 1994 - 2003



Red-headed Woodpecker
Melanerpes erythrocephalus

- Trend Map
- 1966 - 2003



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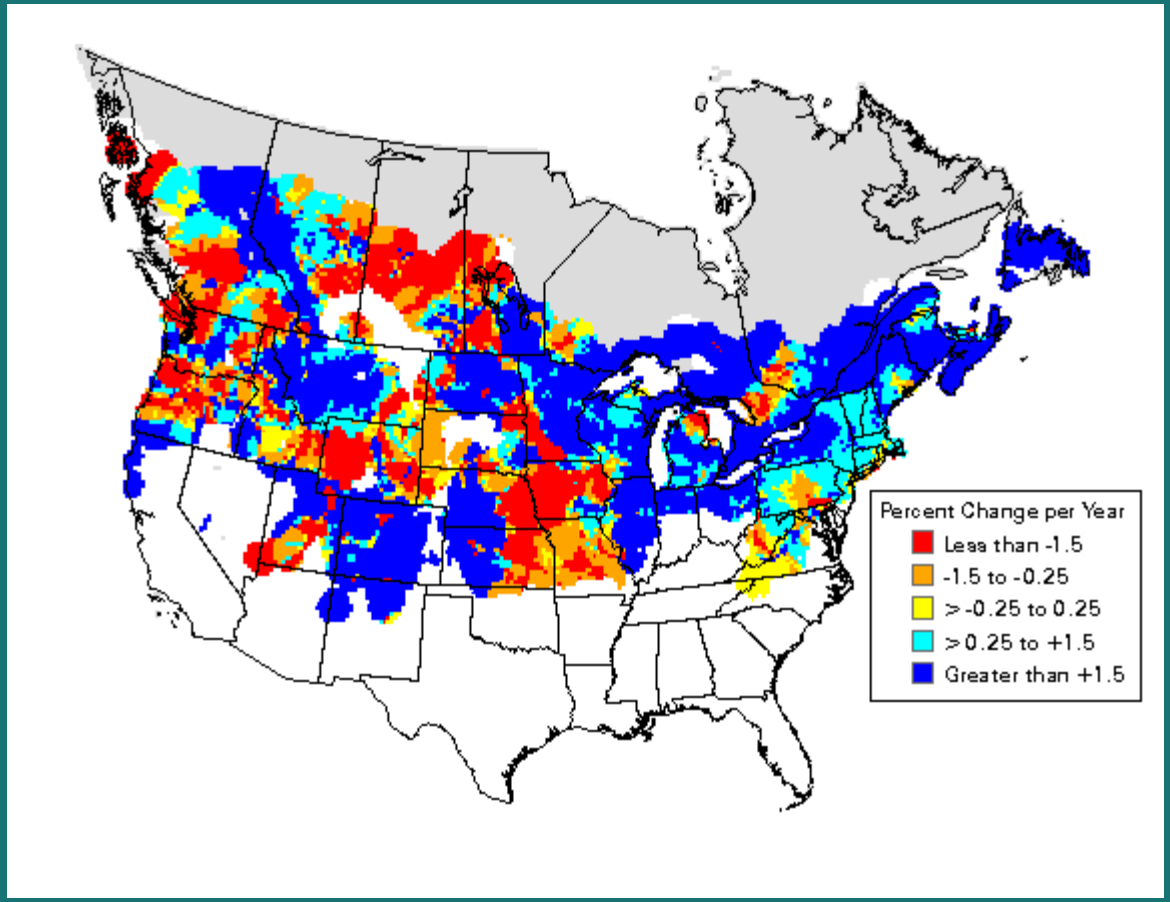
Black-capped Chickadee
Poecile atricapillus

- Trend Map
- 1966 - 2003



North American Breeding Bird Survey

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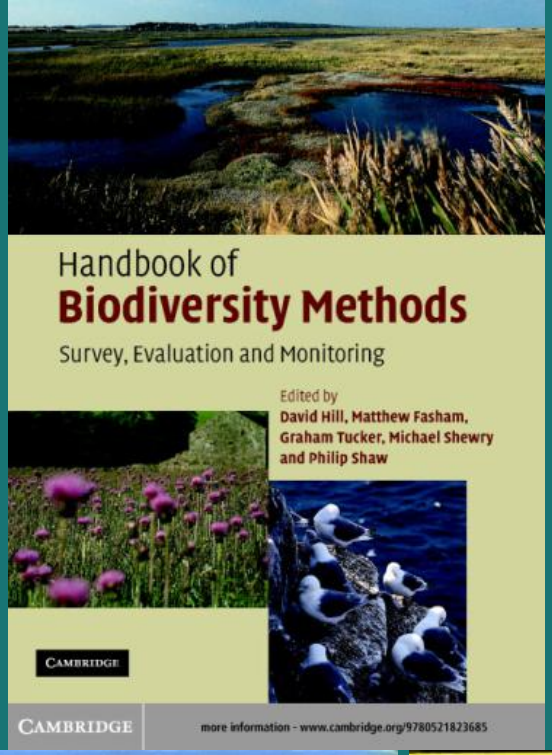
3.常用数量调查方法

- 标图法(spot mapping)
- 截线法(transect)
- 间接测定方法(indirect methods of censusing)


Handbook of
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Edited by
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Graham Tucker, Michael Shewry
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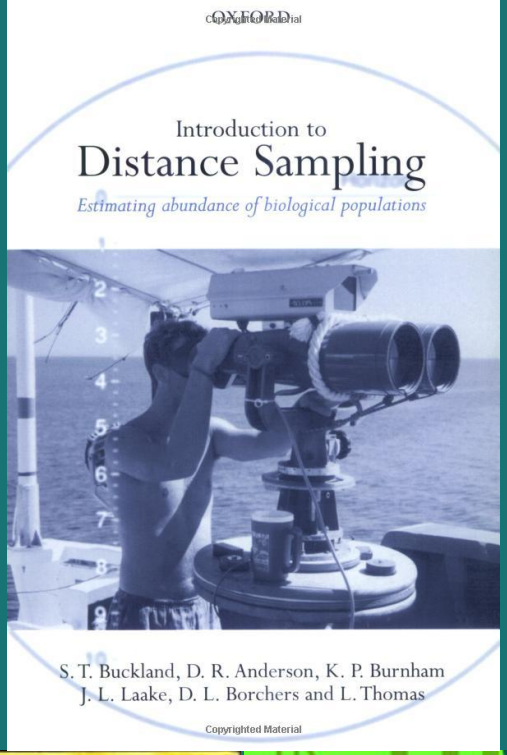
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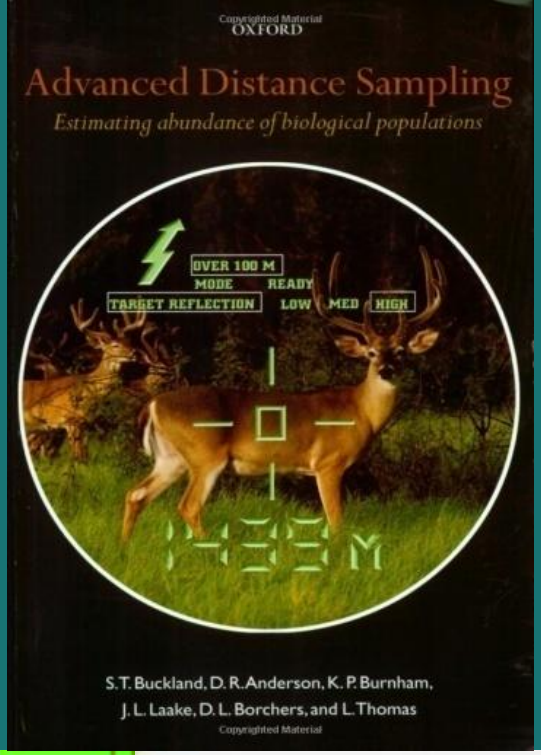
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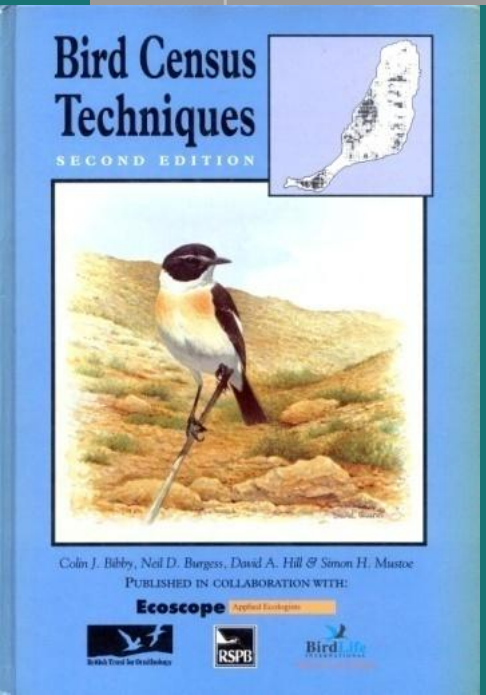
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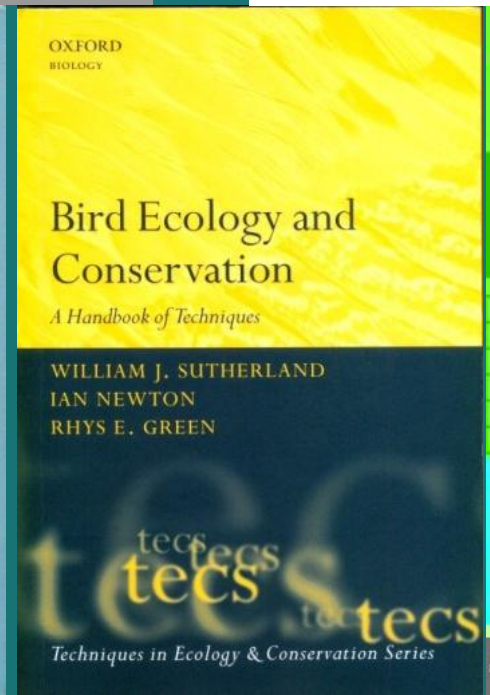
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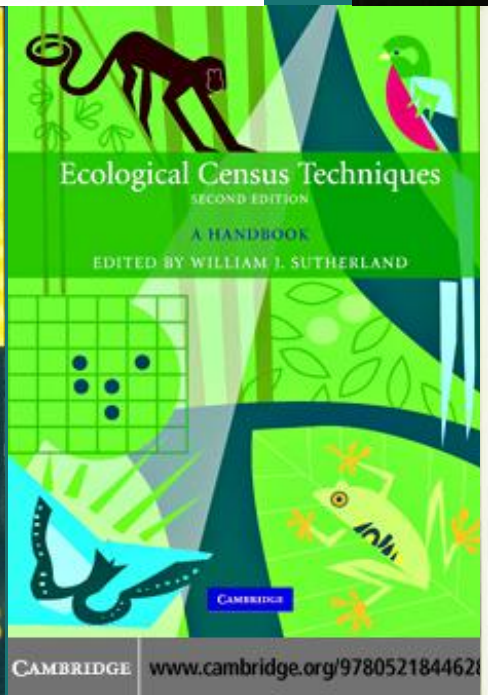
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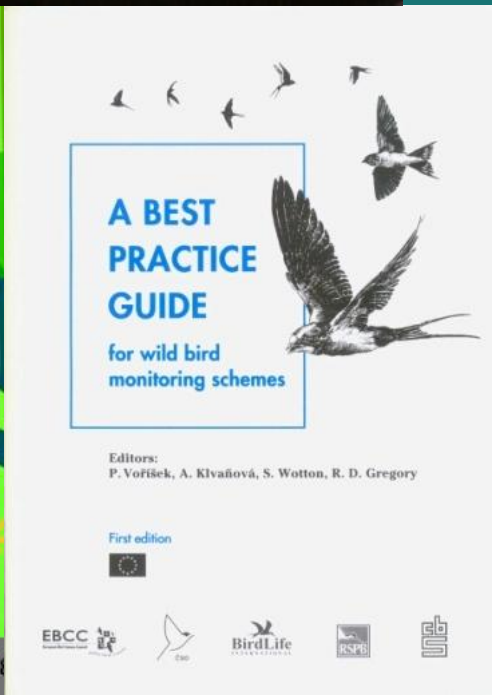
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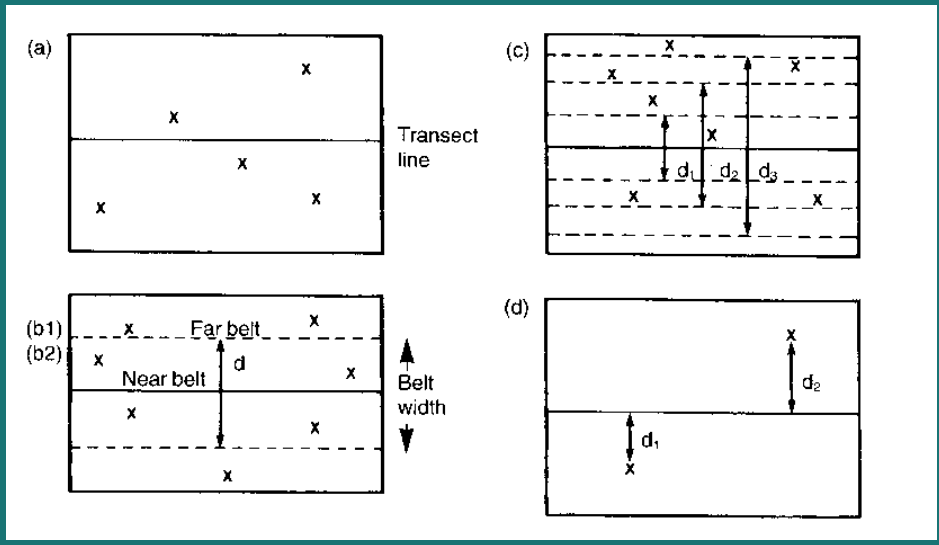
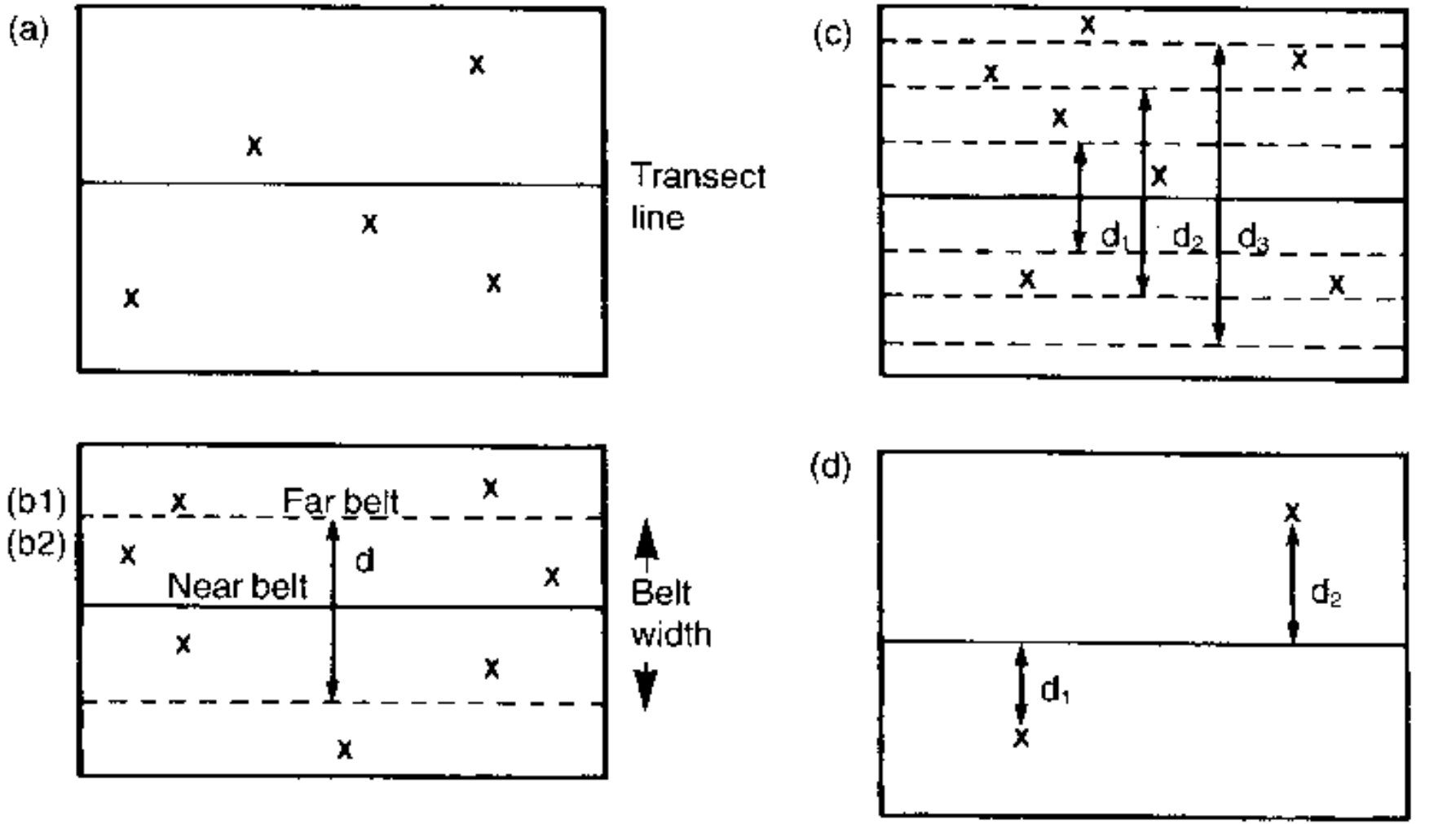
3.1 截线法(transect)

- 样线截线法(Line transect):
  - 固定距离样线法
  - 条带样线法
  - 可变距离样线法



Bibby et al. 2000


(a)
Transect line
(b1)
(b2)
Far belt
Near belt
d
Belt width
(c)
d_1
d_2
d_3
(d)
d_2
d_1

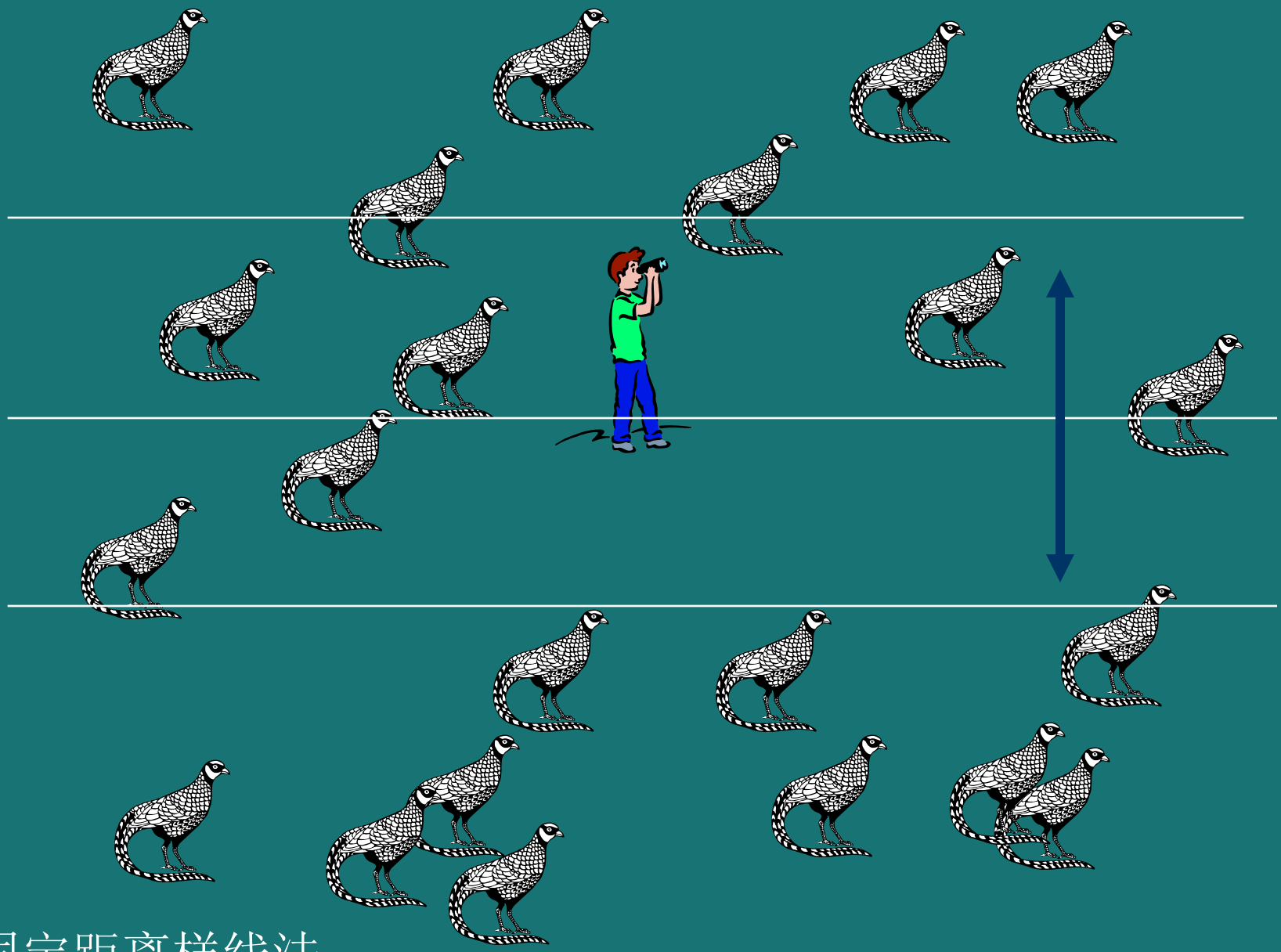
野外工作

- 选择调查路线
- 重复次数：重复次数应在4~6次左右；
- 行走速度：2km/小时左右（开阔地）或 1km/小时左右（较茂密的区域 ）
- 记录鸟类
- 测定距离

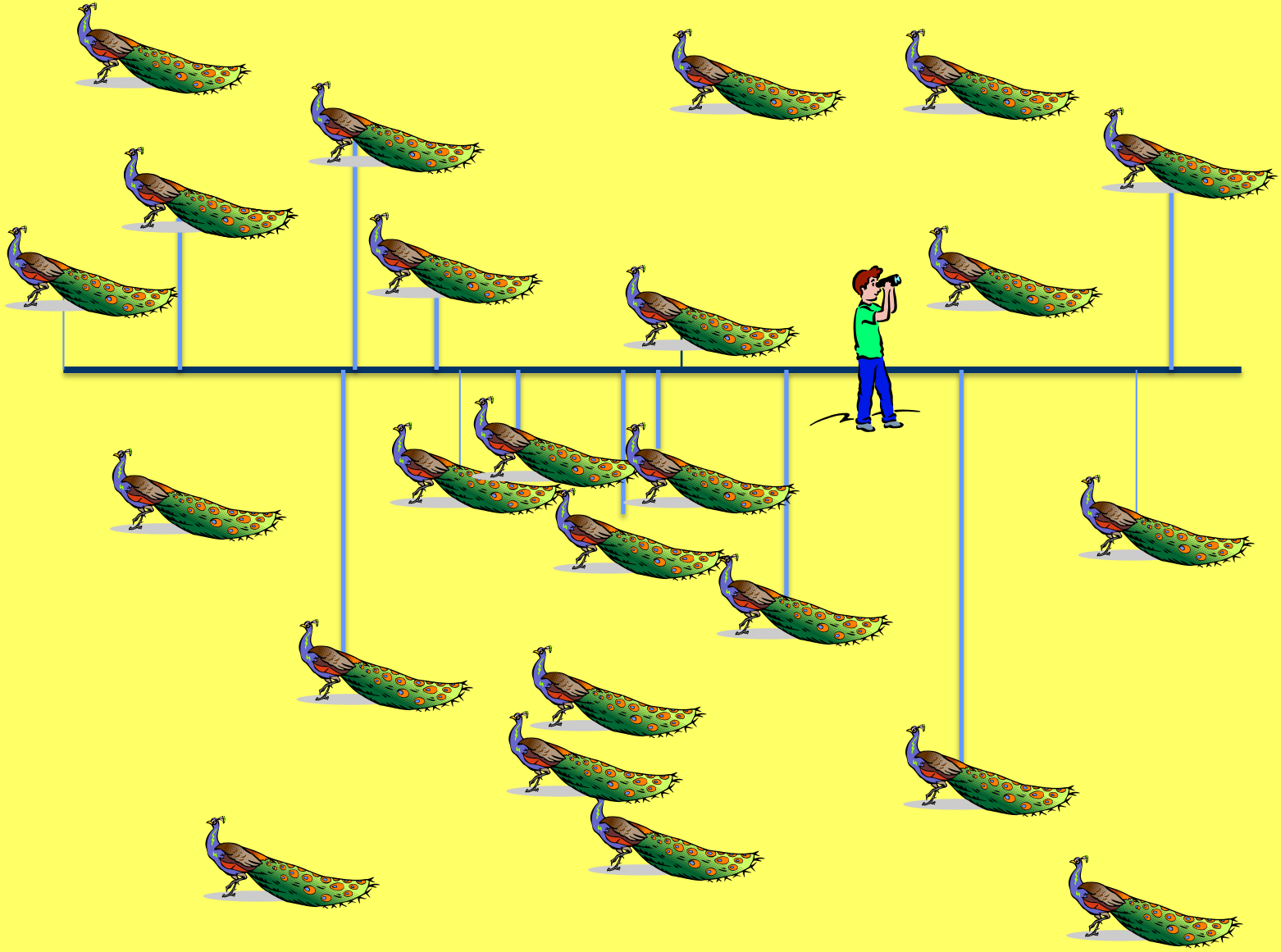
种群密度计算

- $D = N / 2LW$

- D：鸟类密度
- N：野外调查所记录的鸟类数量
- L：样线长度
- W：单侧截线宽度



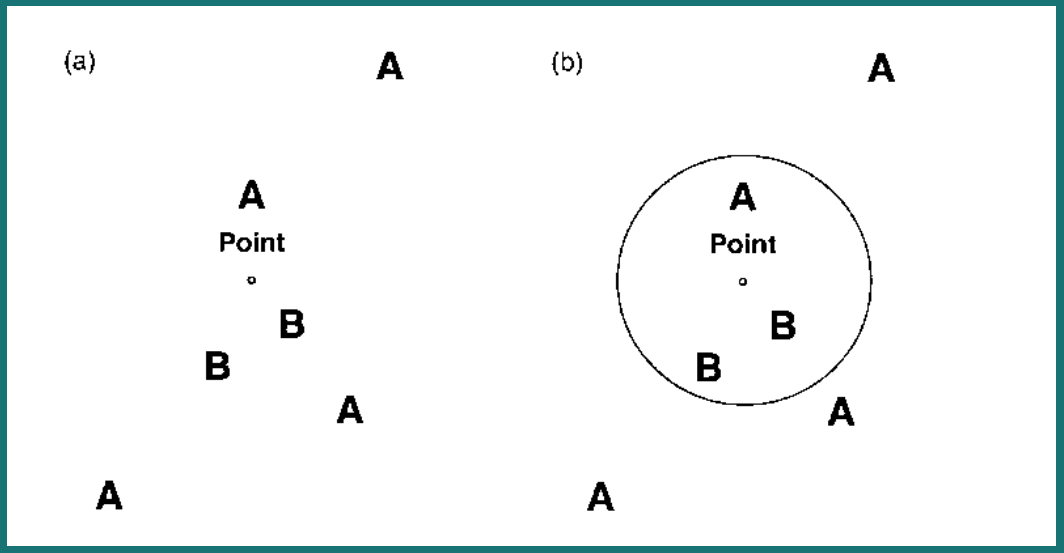
固定距离样线法



可变距离样线法

样点截线法(point transect)

- 一种特殊的样线法，即观察者的行走速度为零时的样线法
- 固定半径样点法
- 区带样点法
- 可变半径样点法



Bibby et al. 2000

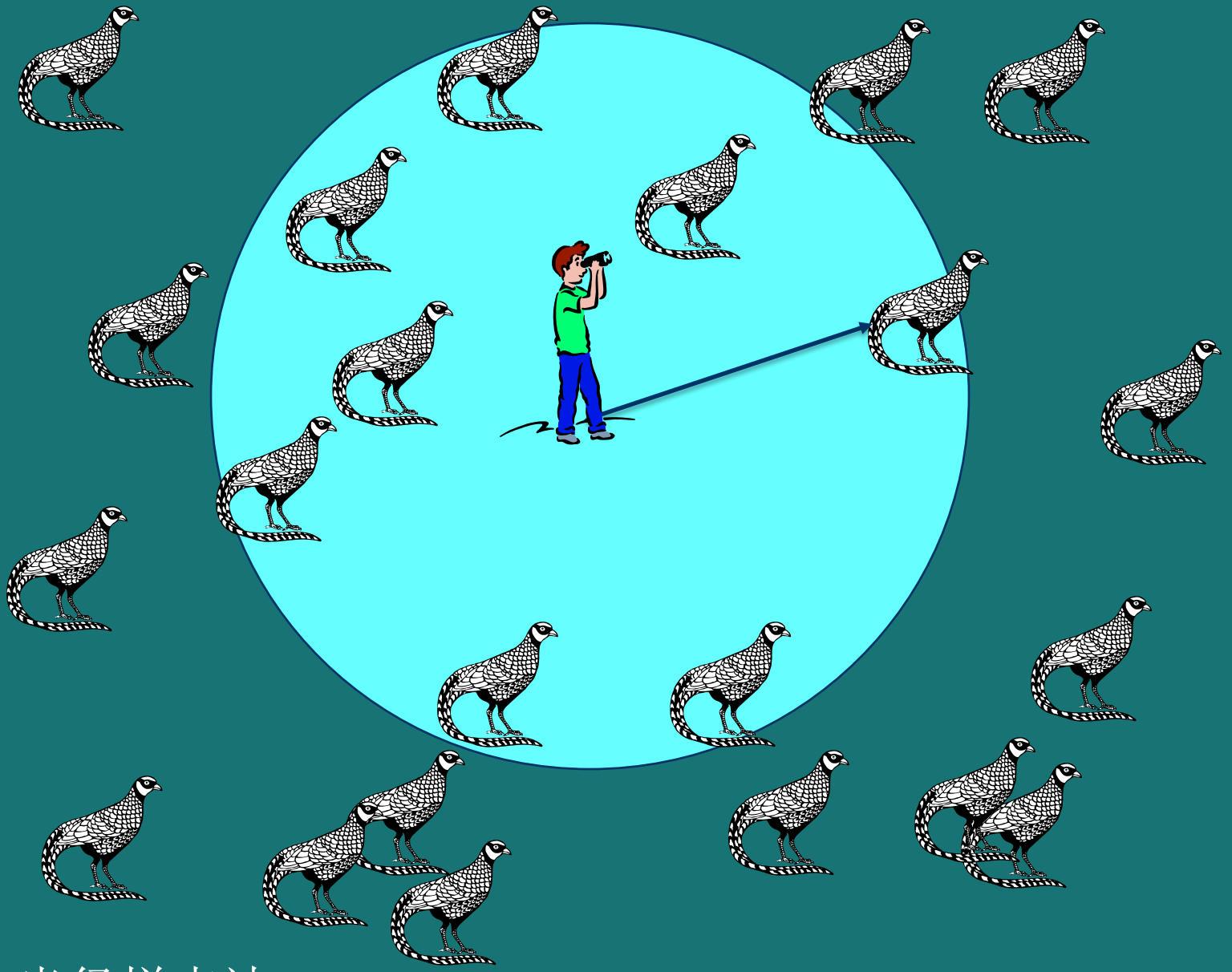
野外工作

- 确定样点：样点间距离100m（固定半径），200m左右（可变半径）
- 样点数量：有效地估计大多数鸟类的密度需20个以上的样点
- 统计持续时间：以8~10分钟的持续时间为最佳
- 重复调查：至少进行2次独立的调查
- 记录鸟类
- 测定距离

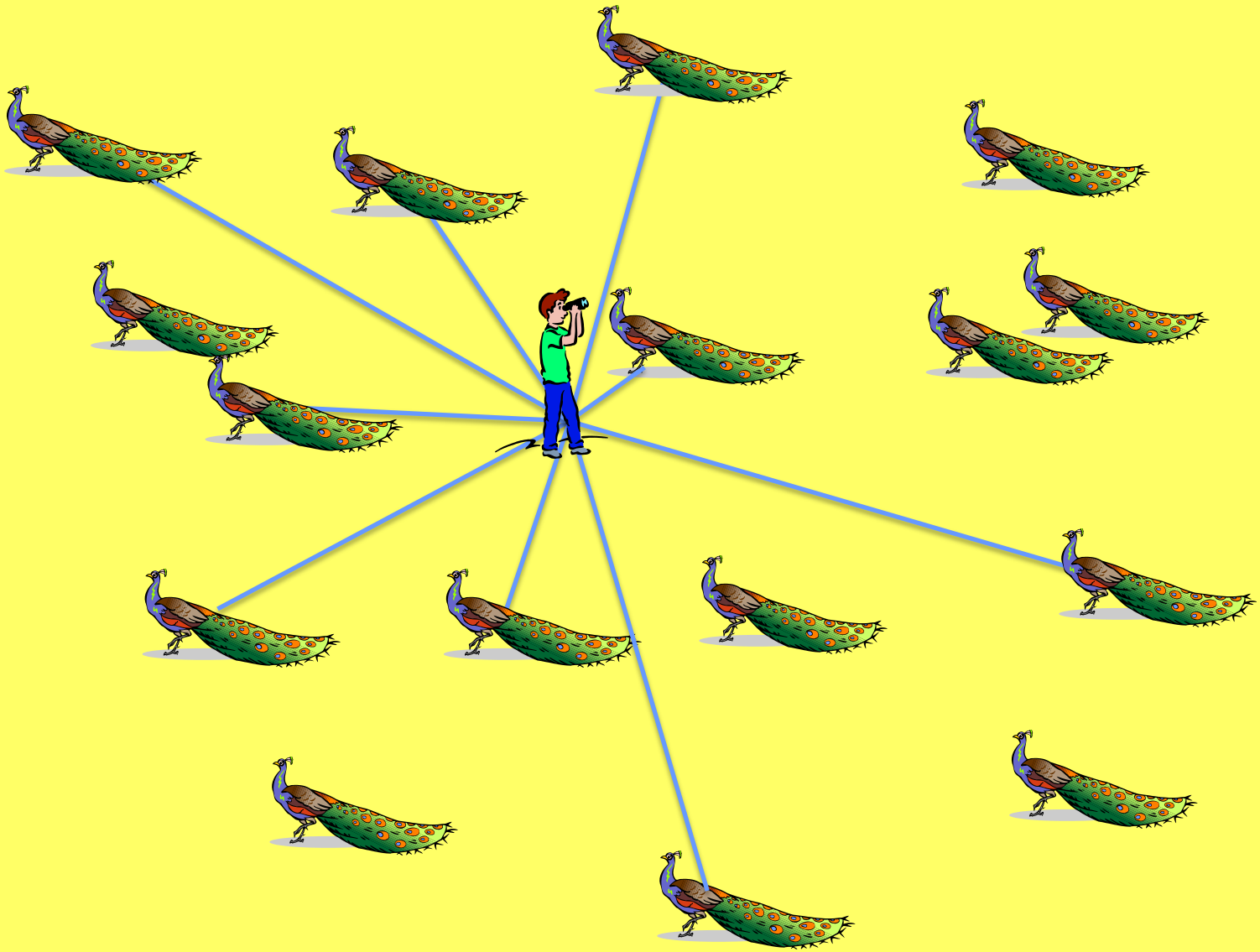
种群密度计算

- $D = N / 3.14r^2$

- D：鸟类密度
- N：每个样点野外调查所记录的鸟类数量
- r：截线半径

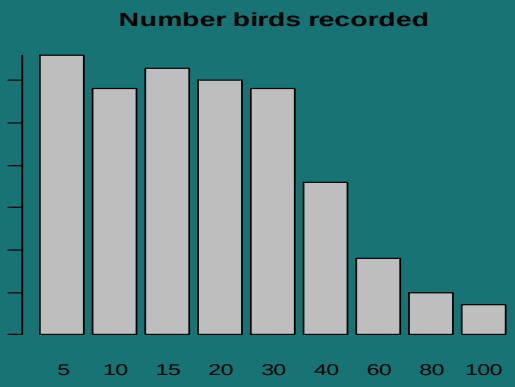


固定半径样点法

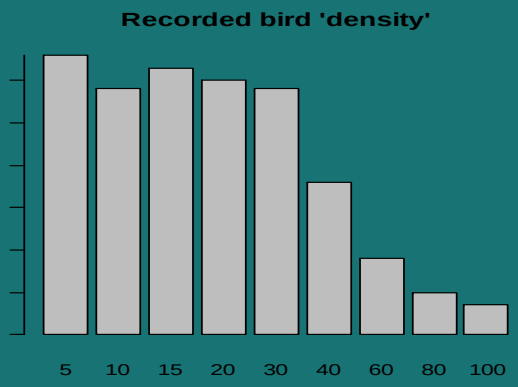


可变半径样点法

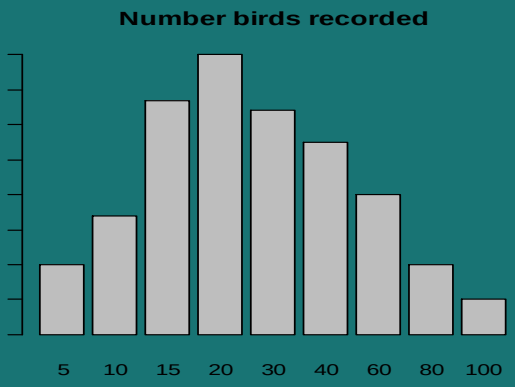
3.2 鸟类发现率与距离间的关系（理想化）



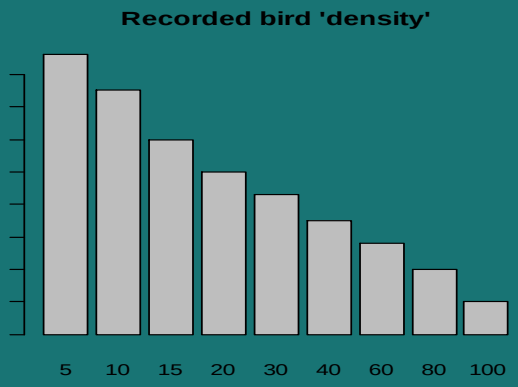
a) Transects - birds recorded



b) Transects - detection curve

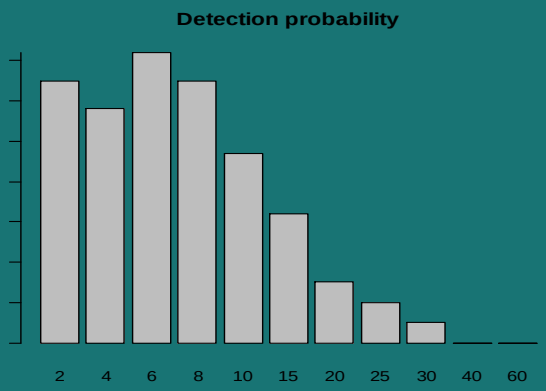


c) Point count - birds recorded

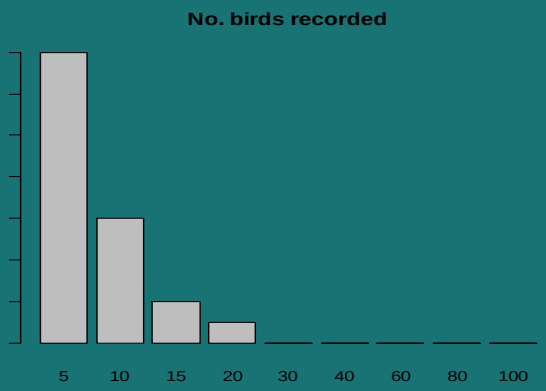


d) Point count - detection curve

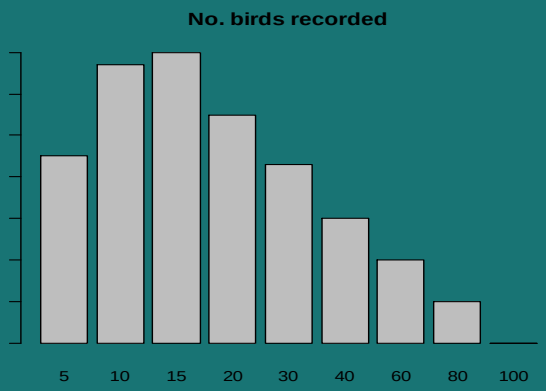
鸟类发现率与距离间的关系（实际）



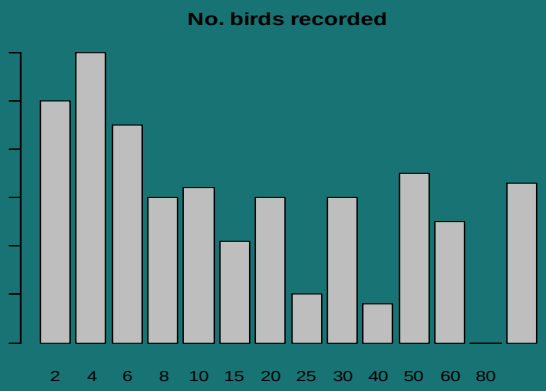
a) Good detection curve with broad shoulder and steep tail



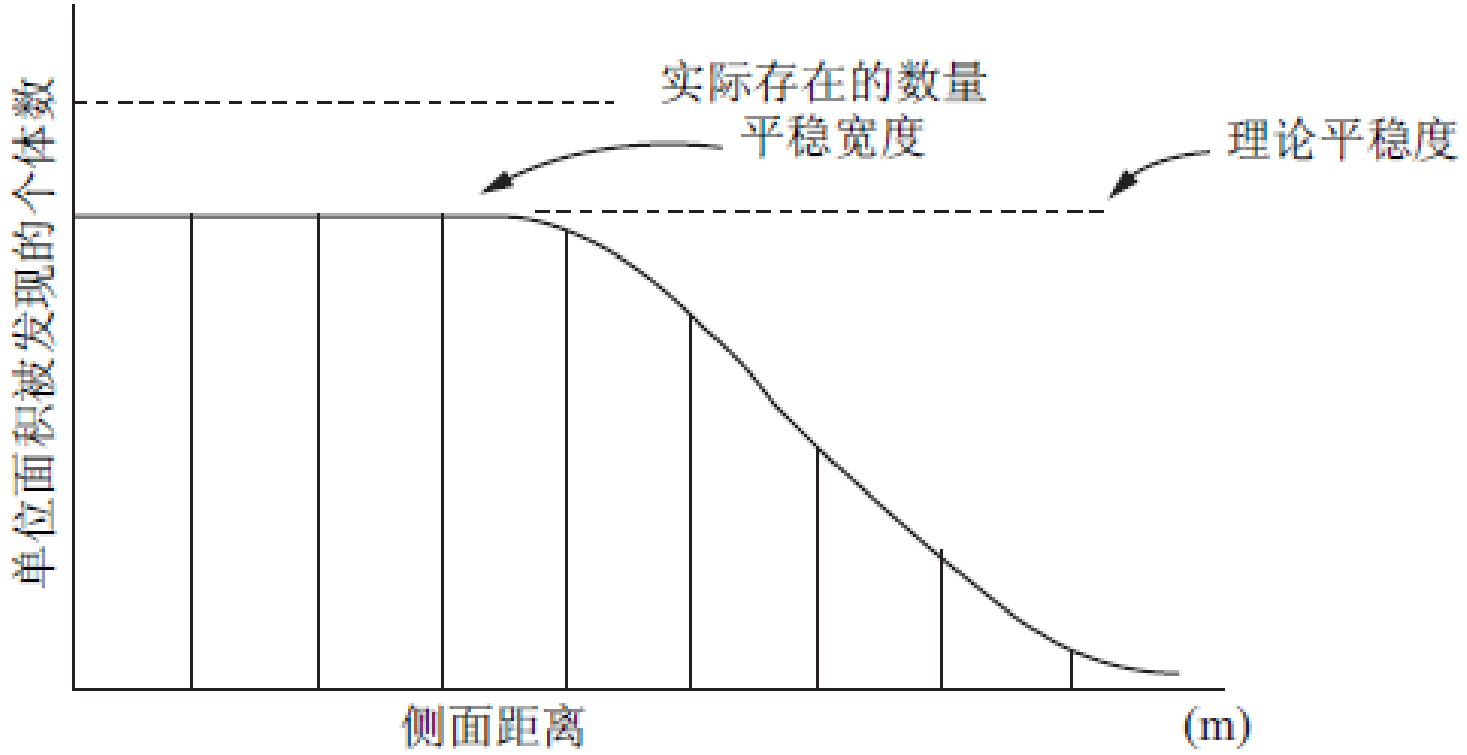
b) Skulking bird often recorded on paths



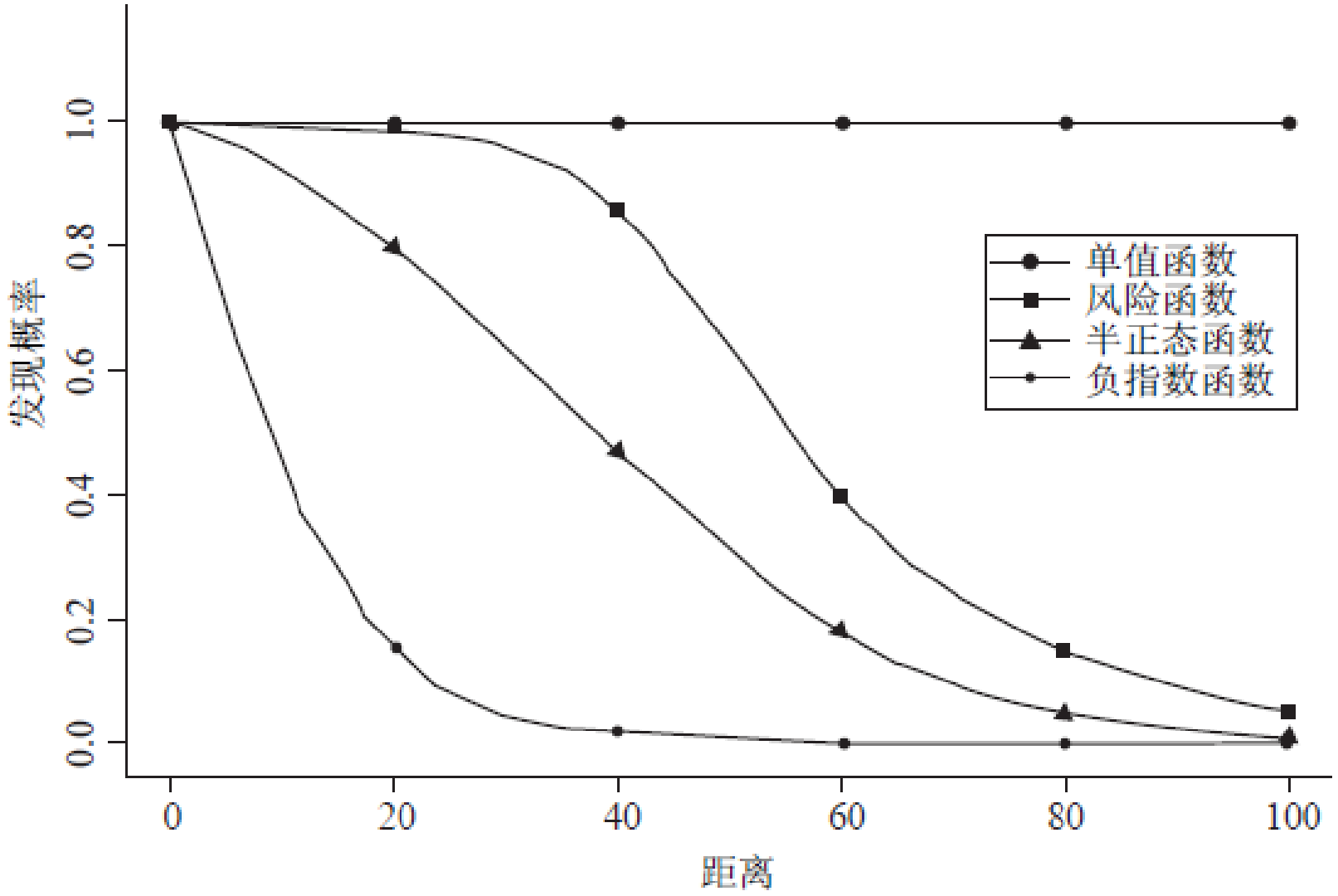
c) Birds move in response to recorder presence



d) Outliers. There may also be a problem with heaping (at 50 and 100m)



图Ⅳ-4　鸟类侧向发现率分布图



图Ⅳ-5　发现函数模型的4种基本类型

Distance

- Distance软件是一种用于距离取样（distance sampling）数据分析的截线法种群数量调查专用分析软件;
- http://www.ruwpa.st-and.ac.uk/distance/

3.3 间接测定方法

- 有无距离估计样线法
- 样点统计法：遇见率样点统计法、频度样点统计法、固定半径样点相对指数法
- 名录法：限时名录法、McKinnon名录法
- 捕获法
- 鸣声录音回放法
- 痕迹法
- 相机拍摄法

重要专著推荐

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- http://ec.europa.eu
- http://miljomal.nu/english/english.php
- http://www.birdlife.org
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- http://www.defra.gov.uk/environment/statistics/wildlife/kf/wdkf03.htm
- http://www.defra.gov.uk/wildlife-countryside/biodiversity/biostrat/indicators/index.htm
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- http://www.wetlands.org
- http://www.wwt.org.uk

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Thanks for your attention