Walking and cycling outcomes for Sustrans in Scotland: assessment against Key Performance Indicators

Sustrans' Scottish Government Grant 2008 - 2011

September 2011

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Executive Summary

Sustrans Scotland and the Scottish Government agreed a set of key performance indicators to cover the grant period between 2008 and 2011. The following outcomes are observed in relation to each indicator:

Key performance indicator 1: monitoring the number of trips made on the National Cycle Network and other links to schools to demonstrate the change in the number of trips, increasing the number of trips made in 2007 by 15% by 2011

Estimated annual usage of the National Cycle Network indicates an increase of 44% in the number of walking and cycling trips made over the funding period, from 28.3 million trips in 2007 to 40.7 million trips in 2010.

Key performance indicator 2: of the 15% increase in trips made on the National Cycle Network, 25% will be by new users

Data collected between 2007 and 2010 suggests that 2.3 million cycling trips were made by people who were new or returning to cycling, 37% of the overall increase in the number of trips. The equivalent figure for pedestrians is estimated at around 900,000.

Key performance indicator 3: estimate the number of users that indicate they have recently increased their levels of physical activity, as well as state the user's current level of physical activity

80% of users state that the presence of the route has helped them to increase their levels of physical activity, and 46.7% of the route users report that they had completed 30 minutes or more of physical activity on five or more days in the past week.

Key performance indicator 4: increase usage on short links by a minimum of 10%

Following Tackling the School Run and Short Link schemes carried out between 2008 and 2010, the estimated annual usage increased by 49% from 1.8 million to 2.7 million trips on routes where these interventions were delivered.

Key performance indicator 5: increase in commuting trips on the National Cycle Network by 15%

In 2010, 35% of all users interviewed on the National Cycle Network were commuting. Although there is wide variation in the proportion of commuters recorded, from few or none, to around 50%, there is evidence of strong growth in commuter numbers from several key routes in large and smaller towns and cities, on well-used and less heavily used routes.

Key performance indicator 6: reduction in trips made by car and saving in CO_2 emissions

27% of pedestrians and 33% of cyclists said that they could have used a car to make their trip instead; if all estimated cyclist and pedestrian trips on the NCN replaced car journeys, the potential carbon dioxide saving is estimated at 46,400 tonnes. Petrol savings would exceed 19 million litres, valued at over £22 million.

Key performance indicator 7: increased tourism revenue to the area and local communities

An *indicative estimate* of the value of the NCN to the Scottish economy in terms of spend by recreational and touring cyclists is almost £100 million per annum; two case studies show marked uplift in the spend associated with particular routes, and a number of other cases estimate the value of economic activity but without a second time point to generate a change value.

Key performance indicator 8: on average, a 10% walking and cycling increase is achieved in the GAGT! intervention locations

An 18% increase (in walking and cycling) was reported in the Get Active Getting There (GAGT!) intervention locations in 2008-9. This was the only year the project was implemented.

Key performance indicator 9: relative increase in trips by sustainable travel modes of 12% in target areas and relative reduction of car trips by 10%

Data from Kirkcaldy, Fife, suggests that there is the potential for trips by sustainable travel modes to increase by 26% in target areas, with a corresponding reduction in car trips of 7%.

Key performance indicator 10: statistical analysis of data obtained from 25 automated cycle counters

Statistical analysis has been performed using data from 54 automatic cycle counters, 37 were located on the National Cycle Network and 17 on other routes including Tackling the School Run and Short Links schemes.

Key performance indicator 11: minimum of ten route user monitoring surveys

Between 2008-2010, 70 route user intercept surveys have been conducted at 57 sites

Key performance indicator 12: quantitative and qualitative research including focus groups. At least two evidence based research papers produced in partnership

Qualitative data collection is underway; by July 2011, two evidence based research papers had been produced by Sustrans Scotland in partnership with other organisations; three conference papers have been presented; two research papers have been published by other organisations drawing on the data assembled by Sustrans in Scotland.

Key performance indicator 13: hands up survey in every primary school – data compiled

Of the 32 local authorities in Scotland, all 32 participated in 2010, when 82% of primary schools returned data for the Hands-Up Scotland survey, compared to 78% in 2008 and 84% in 2009. Sustrans is working with the Scottish Government to enable the dataset to gain National Statistic status.

Key performance indicator 14: attempt to gather data for traffic-free paths from all 32 local authorities

Sustrans currently receives data from 27 local authorities, including 17 authorities who supply automatic cycle counter data. Similar data is expected from three more and all others have been contacted to request data.

Key performance indicator 15: develop a method for measuring the impact on access to jobs and services in project areas

Point-of-origin postcode data plots give a broad indication of the catchment of users and changes in the ranges of destinations being accessed; two case studies show a more diverse trip type base following intervention.

Additional indicators of performance

Numerous additional indicator data sets have been collected that do not correspond to the key performance indicators, usually because they relate to new projects. At 'process level' these include a major travel behaviour survey exercise in Kirkcaldy, a monitoring and evaluation framework for Edinburgh, extensive value for money work using Scottish Transport Appraisal Guidance (STAG) and Health and Economic Assessment Tool (HEAT), and data collection on Street Design, I Bike and Connect2 projects.

The most notable outcome indicators are:

- **STAG-based appraisals generate benefit to cost ratios in the range of 1.4:1 to 12.7:1 for three example Short Links schemes; expanding the assessment to include other benefits gives ratios in the range of 1.6:1 to 14.1:1**
- **the value of the health benefits associated with walking and cycling trips on the National Cycle Network in 2010 is estimated to be £28.4 million and £31.6 million respectively**
- **following I Bike programmes in Edinburgh and Perth, the percentage of pupils who cycled to school every day increased from 3.0% to 7.0%; the percentage of pupils who reported they never cycle to school decreased from 73.3% to 59.0%.**

1 Evaluation of investment in walking and cycling by Sustrans in Scotland

1.1 Introduction

Following a successful bid by Sustrans Scotland to the Scottish Government for funding from 2008 to 2011, Sustrans' Research and Monitoring Unit was invited by Sustrans Scotland to develop and deliver a monitoring and evaluation plan to:

- demonstrate the extent to which the measurable and quantified indicators set out have been achieved, providing evidence for each key performance indicator
- allow Sustrans Scotland to assess the impact of their work using the identified indicators

This document is a final report on the progress made up over the period 2008 to 2011 towards the agreed key performance indicators set for the term of funding.

The key performance indicators on evaluation are one of five sets of indicators against which Sustrans Scotland will report on progress to the Scottish Government. The other four areas are Engineering, Education, Encouragement and Enforcement. Together with Evaluation, these areas comprise the 'five Es' around which the agreement was constructed.

1.2 Key performance indicators for evaluation

The key performance indicators for evaluation are a core part of the funding agreement between Sustrans Scotland and the Scottish Government. The underlying rationale of the indicator set is to demonstrate attainment on two fronts:

- outcomes
- outputs

Some of the indicators relate to specific projects. Others relate to more generic outcome and impact measures, and some treat the monitoring and evaluation activity as a project in its own right. The key performance indicators are:

- KPI1: Monitoring of the number of trips made on the National Cycle Network and other links to schools to demonstrate the change in the number of trips. It is Sustrans Scotland's goal to increase the annual number of trips made in 2007 by 15% by 2011
- KPI2: Of the 15% increase in trips made on the National Cycle Network, 25% will be new users
- KPI3: Estimate the number of users that indicate they have recently increased their levels of physical activity, as well as state the user's current level of physical activity
- KPI4: Increase usage on short links by a minimum of 10%
- KPI5: Increase commuting trips on the National Cycle Network by 15%
- KPI6: Reduction in trips made by car and saving in CO_2 emissions
- KPI7: Increased tourism revenue to the area and local communities
- KPI8: On average, a 10% walking and cycling increase is achieved in the GAGT! intervention locations
- KPI 9: Relative increase in trips by sustainable travel modes of 12% in target areas and relative reduction of car trips by 10%
- KPI10: Statistical analysis of data obtained from 25 automated cycle counters
- KPI11: Minimum of ten route user monitoring surveys
- KPI12: Quantitative and qualitative research including focus groups. At least two evidence-based research papers produced in partnership
- KPI13: Hands up survey in every primary school – data compiled
- KPI14: Attempt to gather data from all 32 local authorities – traffic free paths

- KPI15: Develop a method for measuring the impact on access to jobs and services in project areas.

1.3 Developing a monitoring and evaluation plan

Sustrans' Research and Monitoring Unit developed a monitoring and evaluation plan in 2008 for the collection of data that allows reporting of progress against the key performance indicators. In the first instance this plan drew on Sustrans' considerable knowledge of data collection mechanisms and techniques, and on existing tools that generate output associated with the indicators. However, throughout the project period, innovation in data collection and improvement and development of relevant tools has led to significant improvements in the means by which data are collected and used.

Table 1-1 lists the key performance indicators, describes the nature of the measure required, and details what data collection are applied and which tools are used.

1.4 Form, content and function of this report

The individual sections of the report outline progress made towards meeting each of the key performance indicators. Data are presented to evidence progress and delivery where appropriate.

In addition, we review other areas of work associated with attainment and delivery relating to or derived from the monitoring and evaluation programme. These include:

- the Kirkcaldy travel behaviour survey
- STAG-based analysis of scheme value for money
- development of a monitoring and evaluation framework for the Edinburgh ATAP
- a qualitative study of the impacts of community links schemes
- data collection associated with the I Bike programme
- Street Design data collection
- Connect2 data collection and highlights to date.

Recommendations are made for how future monitoring and evaluation work can be improved and used to inform the development of any future key performance indicator framework that Sustrans Scotland may wish to develop to support their work with the Scottish Government.

1.5 A brief consideration of data collection and analysis tools used

A range of well-established and tailored or modified data collection tools, analytical processes and analysis tools are used in order to generate the evidence for the report. The data collection tools include automatic cycle counters, route user intercept surveys, manual cordon counts, and the Hands-Up Survey Scotland. A range of analytical processes are subsequently applied to enable us to interpret and translate the data. Data analysis tools used include:

- Scottish Transport Appraisal Guidance (STAG)
- Health and Economic Assessment Tool (HEAT)
- calculation of estimated CO_2 savings
- measuring economic impacts of tourism.

A fuller description of the methodological process for each element is provided in Appendix 1.

Table 1-1: Key performance indicators and approaches to monitoring and evaluation

No.	Indicator	Target Type	Tools and Methods
KPI1	Monitoring of the number of trips made on the National Cycle Network and other links to schools to demonstrate the change in the number of trips. It is Sustrans Scotland's goal to increase the annual number of trips made in 2007 by 15% by 2011	Quantified	Automatic cycle counters, route user intercept surveys, manual counts
KPI2	Of the 15% increase in trips made on the National Cycle Network, 25% will be new users	Quantified	Route user intercept surveys, manual counts, automatic cycle counters
KPI3	Estimate the number of users that indicate they have recently increased their levels of physical activity, as well as state the user's current level of physical activity	Quantified	Route user intercept surveys, manual counts, automatic cycle counters
KPI4	Increase usage on short links by a minimum of 10%	Quantified	Automatic cycle counters, route user intercept surveys, manual counts
KPI5	Increase commuting trips on the National Cycle Network by 15%	Quantified	Route user intercept surveys, manual counts, automatic cycle counters
KPI6	Reduction in trips made by car and saving in CO_2 emissions	Quantified	Automatic cycle counters, route user intercept surveys, manual counts; DfT's carbon emissions tool
KPI7	Increased tourism revenue to the area and local communities	Quantified	Automatic cycle counters, route user intercept surveys, manual counts; Sustrans' tourism revenue model
KPI8	On average, a 10% walking and cycling increase is achieved in the GAGT! intervention locations	Quantified	Route user intercept surveys, other surveys, manual counts, automatic cycle counters
KPI9	relative increase in trips by sustainable travel modes of 12% in target areas and relative reduction of car trips by 10%	Quantified	Travel behaviour surveys
KPI10	Statistical analysis of data obtained from 25 automated cycle counters	Process monitoring	Analysis and reporting
KPI11	Minimum of ten route user monitoring surveys	Process monitoring	Selection, commissioning, analysis, reporting
KPI12	Quantitative and qualitative research including focus groups. At least two evidence-based research papers produced in partnership	Process monitoring	Supporting in set up, analysis, reporting
KPI13	Hands up survey in every primary school – data compiled	Process monitoring	Set-up, collation, analysis reporting
KPI14	Attempt to gather data from all 32 local authorities – traffic free paths	Process monitoring	Collation , communication
KPI15	Develop a method for measuring the impact on access to jobs and services in project areas	Process monitoring	Route user intercept surveys, other surveys

2 Key performance indicators

2.1 Usage of the National Cycle Network and other links

Key performance indicator 1: Monitoring the number of trips made over the funding period on the National Cycle Network and other links to schools to demonstrate the change in the number of trips, increasing the number of trips made in 2007 by 15% by 2011

Estimated annual usage of the National Cycle Network indicates an increase of 44% in the number of walking and cycling trips made, from 28.3 million trips in 2007 to 40.7 million trips in 2010.

Summary

- a number of distinct indicators show an increase in levels of usage on the National Cycle Network
- an estimated 40.7 million walking and cycling trips were made on the National Cycle Network in Scotland during 2010
- calculations using all available data since 2006 for 37 automatic cycle counters on the National Cycle Network estimate an annual average change of +3.2% in the average daily count of cyclists
- this compares with no change in levels of cycling activity at 17 sites that are not on the National Cycle Network and +2.4% across all of the sites for which data are available
- secondary analysis of automatic cycle counter data using data collected between April and September from 25 sites on the National Cycle Network indicated an annual average change of 5.5%, suggesting that the winter weather of 2009/10 and 2010/11 may have had a pronounced effect on rates of growth in cycling activity

Approach

KPI 1 is assessed using a range of indicators derived from a variety of data types - automatic cycle counter data, route user intercept surveys and manual classified counts, including pedestrian counts. The aim is to review the consistency in 'direction of travel' for the indicators. A consistent value in each case should not be expected due to methodological variability.

The primary headline figure is derived from the Scottish inputs to the National NCN overall usage model. Some continuous cycle count data is available covering the whole reporting period. Data are available from points on the National Cycle Network as well as other locations in Scotland. This data is analysed *en bloc* across the whole year, but selective seasonal analyses are also undertaken to investigate the extent of impact of recent extreme winter weather. The locations for route user intercept surveys for the period 2008 – 2011 are shown in Map 1 in Appendix 2. Pre and post route user intercept surveys have been collected at 27 sites. This data allows comparisons to be made over time for survey site locations. Repeat surveys often measure change recorded prior to an intervention taking place, such as Tackling the School Run and Short Links schemes. Repeat surveys are also undertaken to measure change in usage over time for existing routes with no particular associated intervention.

Annual usage estimates – national level

During 2007 an estimated 28.3 million trips were made on the National Cycle Network in Scotland. In 2010 the estimate usage estimate for cyclists and pedestrians was 40.7 million trips, a 44% increase (see appendix 1, section 1.2, for methodological explanation).

Table 2-1: Annual usage estimates of pedestrian and cyclists trips on the National Cycle Network in Scotland (2007 – 2010)

	Annual usage estimate (AUE) total	AUE cyclists	AUE pedestrians
2007	28.3 million	16.2 million	12.1 million
2008	31.3 million	18.0 million	13.3 million
% change since 2007	+11%	+11%	+10%
2009	37.3 million	21.0 million	16.3 million
% change since 2007	+32%	+30%	+35%
2010	40.7 million	22.6 million	18.0 million
% change since 2007	+44%	+40%	+49%

Automatic cycle counter data

Data collected from a total of 54 automatic cycle counter locations in Scotland from 2006 onwards were analysed in order to determine trends in levels of cycling over time. Analysis of seven-day data from 37 count sites on the National Cycle Network indicated an average annual change of +3.2%. This equates to an overall change of +17.1% over the period to the end of 2010. Data from 17 counters located on other routes show no measurable change in usage. Considering all 54 sites, the annual average change is +2.4% per annum, or 12.1% from 2006.

A secondary analysis was performed using data collected between April and September of each year in order to investigate the impact of the poor winter weather of recent years on overall trends in levels of cycling. A total of 38 counters were included in this analysis. For 25 counters on the National Cycle Network, the annual average change was +5.5% per annum, compared to +2.4% per annum for 13 counters on other routes and +4.4% per annum for all counters included in the analysis.

The median daily count across the whole time series for each counter site, and the average annual change in the daily median count, expressed as both a count and a percentage, are presented in Appendix 2. Map 2 shows the locations of all counters where analysis has taken place. Map 3 illustrates the magnitude of change at these individual sites. Maps 4 to 6 show more detail for individual locations in the north, central and southern regions.

Annual usage estimates – examples from particular routes

Eight sets of baseline and follow-up route user intercept surveys have been conducted on the National Cycle Network in Scotland since 2006, and a further four have been undertaken on links close to the NCN. Of these sets, nine show an increase in the annual users of particular routes. Eight of the sets show an increase of more than 15%. These data are summarised in Table 2-2.

When aggregated, usage at these 12 sites increases by 34.1% for all users, 97.2% for cyclists and 21.3% for pedestrians.

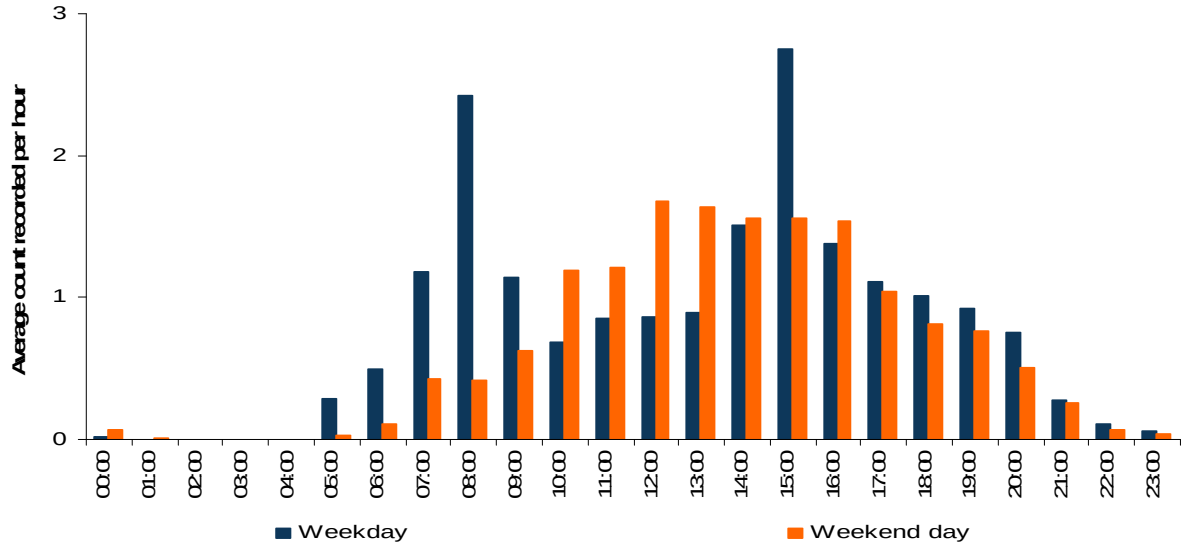
Table 2-2: Breakdown of annual usage estimates (AUE) reported from repeat route user intercept surveys

Survey site	Year	AUE cyclists	AUE pedestrians	AUE overall	Year	AUE cyclists	AUE pedestrians	AUE overall	Scheme	Site description	AUE overall % change
Bathgate, West Lothian	2007	8,649	42,338	51,248	2009	1,393	44,972	46,658	Tackling the School Run	Link to NCN 75 – urban traffic-free	↓
North Inch, Perth	2008	23,019	110,896	146,890	2009	11,283	128,593	147,558	Active Travel	NCN 77 – urban traffic-free	↑ <15%
St Catherine's, Perth	2008	1,686	277,828	286,142	2009	22,098	328,482	361,389	Active Travel	NCN 775 – urban road	↑ >15%
Appin, Benderloch	2006	27	2,677	2,704	2010	5,001	4,860	10,882	-	NCN 78 – Rural traffic-free	↑ >15%
Bells Bridge, Glasgow	2007	43,518	418,327	466,244	2010	100,561	292,055	398,461	-	NCN 7 – Urban traffic-free	↓
Cullen, Moray	2007	2,333	25,465	28,584	2010	9,501	33,714	44,029	-	Near NCN1 – urban traffic-free	↑ >15%
Dumfries Railway Path	2006	5,143	21,569	27,154	2010	13,474	26,613	43,047	-	NCN7 – Urban traffic-free	↑ >15%
Dyce, Aberdeen	2006	15,439	12,326	31,060	2010	24,804	11,136	37,127	-	NCN1 – urban traffic-free	↑ >15%
Union Canal, Edinburgh	2006	104,008	121,529	271,181	2010	202,081	183,746	475,707	-	NCN75 – urban traffic-free	↑ >15%
Bridge St, Callander	2009	6,416	201,665	211,119	2009	10,712	196,149	210,740	Tackling the School Run	NCN7 – urban traffic-free	↓
Dingwall to Invergordon	2007	10,083	3,619	13,702	2009	14,519	3,048	17,567	Tackling the School Run	Near NCN1 – rural road	↑ >15%
Dumbarton	2007	8,362	113,821	124,235	2009	35,524	387,158	434,026	Tackling the School Run	NCN7 – urban traffic-free	↑ >15%

Case study of growth attributable to specific events: Hopeman/Duffus

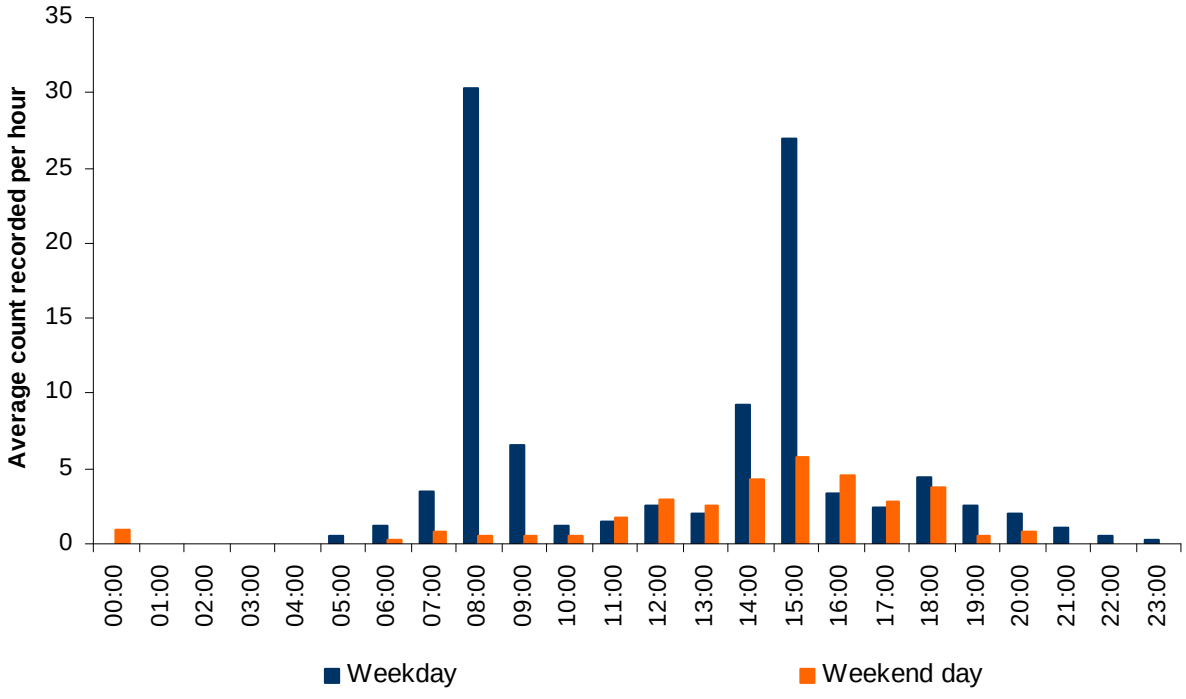
A total of 22 months of data are available for the cycle counter located between the villages of Hopeman and Duffus in Moray, just north of Elgin. This route was built for a Tackling the School Run scheme. Chart 2-1 shows that (although overall use is low) most cyclists are recorded using the route at 8am and 3pm on weekdays, suggesting that this route is used for the school run.

Chart 2-1: Hourly distribution of cyclists for the counter on the Hopeman to Duffus route



The counter located on the Hopeman to Duffus route shows unusually high counts during Bike Week in June 2010. Chart 2-2 shows a marked increase in the number of cycles travelling at school commuting times compared to typical numbers. At 0800h and 1500h on weekdays, this increase is 10-fold, whilst there are also substantial increases at 0900h and 1400h.

Chart 2-2: Hourly distribution of recorded cyclists for the counter on the Hopeman-Duffus route during Bike Week, June 2010



2.2 New users on the National Cycle Network

Key performance indicator 2: of the 15% increase in trips made on the National Cycle Network, 25% will be by new users

Data collected between 2007 and 2010 suggests that 2.3 million cycling trips were made by people who were new or returning to cycling, 37% of the overall increase in the number of trips. The equivalent figure for pedestrians is estimated at around 900,000.

Summary

- route user intercept surveys conducted across five sites on the National Cycle Network in 2010 indicate that 0.5% of users were first time users of the particular stretch of route where they were intercepted
- 10.4% of cyclists interviewed state that they are novice cyclists, either new to cycling or starting to cycle again
- this equates to an estimated 2.3 million trips undertaken by new and returning cyclists, 37% of the additional 6.4 million cycling trips undertaken on the NCN in 2010 relative to 2007
- a simple, conservative equivalent exercise for pedestrians suggests that an additional 900,000 trips are undertaken by people newly engaging in walking
- growth in recorded counts of cycles in commuter periods, and especially in non-commuter periods, may be attributable to new users.

Approach

KPI 2 is assessed using a small number of indicators derived from different data types - automatic cycle counter data, route user intercept surveys and manual classified counts. As with KPI1, the aim is to review the consistency in 'direction of travel' for the indicators.

In the first instance, the proportion of new users recorded is generated, and expressed in absolute terms. The implication of the figures derived for KPI1 are also explored in the context of new users. Continuous cycle count data is explored for patterns that may indicate new user activity.

Estimates of new users derived from route user intercept surveys and annual usage estimates

Route user intercept surveys conducted on the NCN in 2010 have explored respondents' level of usage, including whether they are a first time user of the particular route where they were intercepted. Questions on levels of cycling experience were asked at five survey sites on the National Cycle Network only. Data for cyclists interviewed across the five sites indicate that 0.5% classified themselves as new to cycling, and 9.9% are starting to cycle again.

The contribution of trips by new and starting again cyclists to the increase in trips made on the NCN is estimated using data outlined in table 2.1 above. Over the period 2007 to 2010 an additional 6.4 million cycling trips were made on the National Cycle Network. In 2010, 10.4% of survey respondents indentified themselves as 'new or returning to cycling.' Applying this percentage of users to the 22.6 million cycling trips made in 2010 results in an estimated 2.3 million trips undertaken by new and returning cyclists. This represents an estimated increase 37% of the additional 6.4 million cycling trips undertaken on the NCN between 2007 and 2010.

Although equivalent data does not exist for pedestrians, working through the same calculation sequence, but assuming a much more conservative 5% of new and returning users (relevant data is not collected in the survey), the number of additional walking trips would be just over 900,000.

Examples of high proportions of new users recorded at route user intercept survey sites

Specific examples of substantial proportions of use by novice cyclists include:

- a route user intercept survey conducted on an urban, traffic free section of NCN National Route 75 on the Union Canal, Edinburgh, in 2010 found that 11.6% of cyclists surveyed were either new to cycling or starting to cycle again
- a route user intercept survey conducted on an urban, traffic-free section of NCN National Route 7 at Bells Bridge, Glasgow, in 2010 reported that 12.1% of those surveyed said they were starting to cycle again (none reported that they were new to cycling).
- a route user intercept survey conducted on an off-road, urban-fringe section of NCN National Route 1 in Dyce, Aberdeen reported that 4.5% of those surveyed were starting to cycle again (none reported that they were new to cycling).

Automatic cycle counter data

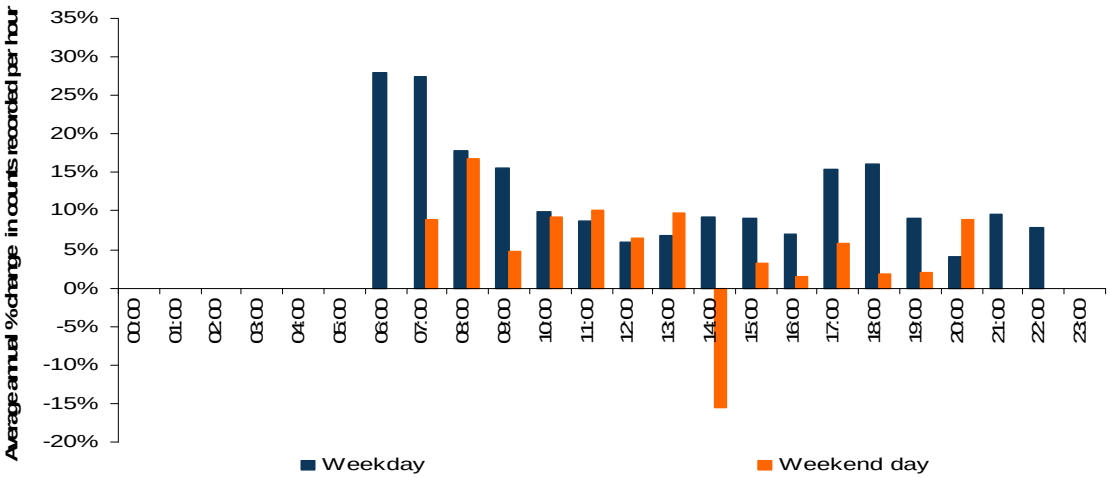
Although continuous count data for cyclists can not tell us details of whether users are new to cycling or starting to cycle again, it is possible to interrogate the data to identify the hours of the day when the most substantive changes in usage occur. Two examples are shown below.

Case study: Dalgety Bay

A total of 56 months of data are available for the cycle counter at Dalgety Bay, a traffic-free section of National Cycle Route 76 on the north side of the Forth Road Bridge. The number of cyclists counted at this location is greater on weekend days, when the median daily count is 45, compared to weekdays with a median daily count of 28. On the basis of the data available the annual increase in the average count per weekend day is 10%, less than week days where the annual increase is 18%.

Chart 2-3 below shows the annual average change in the count recorded in each hour of the day, showing increases to occur across the day for both weekdays and weekend days, although the analysis suggests a more prominent change associated with key commuting times in the weekday data.

Chart 2-3: Annual average change in the count recorded in each hour of the day at Dalgety Bay



From this we can infer that usage is growing in fact during most periods of the day on weekends and weekdays, and we may reasonably assume that some of this growth is by new users.

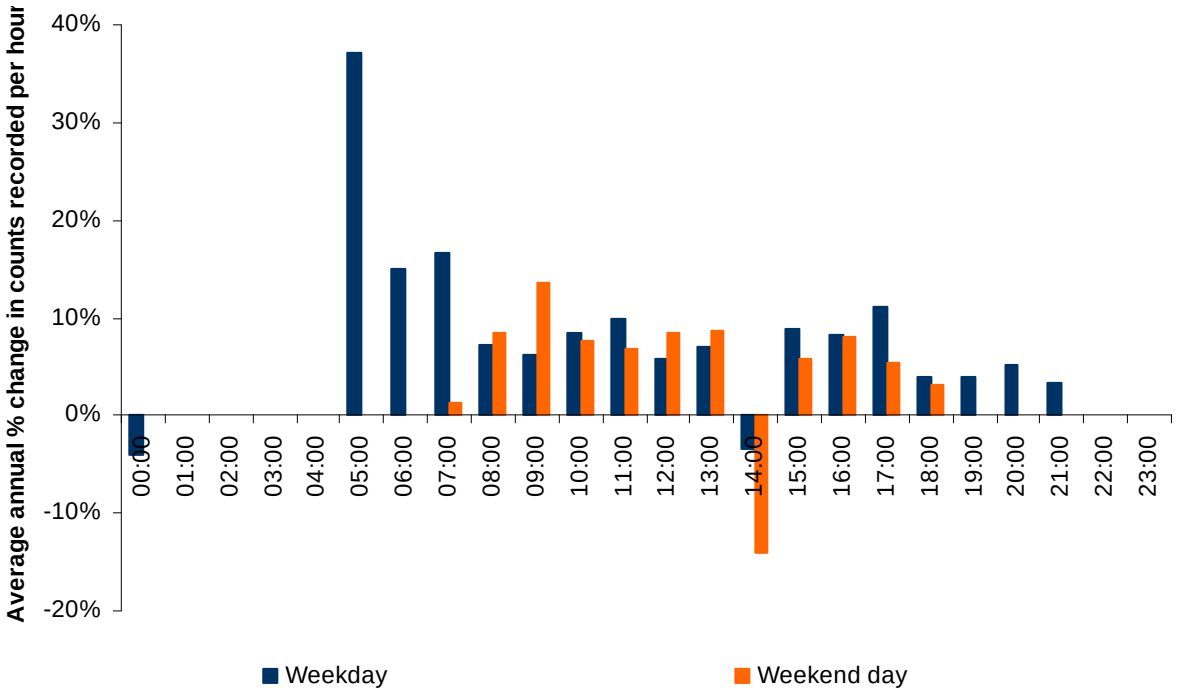
Case study: Dunfermline to Alloa

A total of 57 months of data are available for the cycle counter on the route between Dunfermline and Alloa, a traffic-free section of the National Route 764 that runs between Fife and Clackmannanshire. The number of cyclists counted at this location is also greater on weekend days, when the median daily count is 64, compared to weekdays with a median daily count of 41. On the

basis of the data available the annual increase in the average count per weekend day is 14%, the same as for commuting days.

Chart 2-4 below shows the annual average change in count recorded in each hour of the day, suggesting increases to occur throughout the day in both the weekend and weekday data

Chart 2-4: Annual average change in the count recorded in each hour of the day at Dunfermline/Alloa



Once again we can assume that a proportion of this growth in numbers is attributable to new users, although precisely quantified attribution is not possible.

2.3 Route usage and increase in levels of physical activity

Key performance indicator 3: estimate the number of users that indicate they have recently increased their levels of physical activity, as well as state the user's current level of physical activity

80% of users state that the presence of the route has helped them to increase their levels of physical activity, and 46.7% of the route users report that they had completed 30 minutes or more of physical activity on five or more days in the past week.

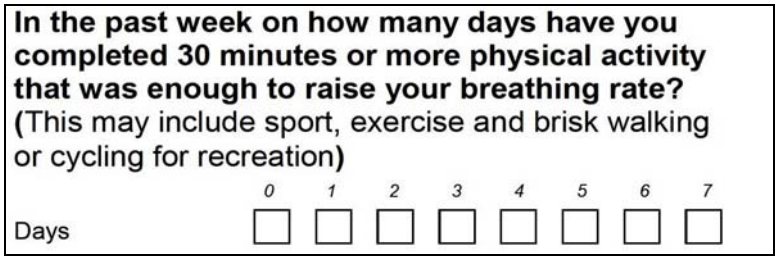
Summary

- 80% of users in 2008 state that the presence of the routes (on which they were intercepted and interviewed) has helped them to increase their levels of physical activity
- 49.3% of users in 2009 and 44.4% of users in 2010 report that they had completed 30 minutes or more of physical activity on five or more days in the past week; this is not reflective of a trend

Approach

Up to 2009, as part of the route user intercept surveys, Sustrans asked the question: 'Has the presence of the route helped you to increase the level of physical activity that you regularly take?', with the response options: 'Yes, by a large amount', 'Yes, by a small amount' and 'No'. In 2009, Sustrans' Research and Monitoring Unit, as a result of work funded through the Big Lottery Fund (Sustrans' Active Travel Consortium), worked in partnership with a number of funders (including Scottish Government Health Department, NHS Health Scotland) and the British Heart Foundation National Centre for Physical Activity and Health to develop a single-item physical activity measure. The single item measure has been designed for use as a monitoring tool, suitable for assessing the current physical activity status of programme participants such as route users and has been tested in terms of cognitive testing, test-retest reliability and concurrent validity. The question used concerns activity over the past week, specifically:

Figure 2-1: The Single Item Measure for Physical Activity, used in route user surveys to ascertain respondent's levels of physical activity since 2009



Government guidelines for the period 2009 – 2011 recommended adults being active for a total of 30 minutes a day for five or more days of the week. However, UK Government guidance on recommended levels of physical activity has recently changed, and future questionnaires will be re-designed to reflect this change.

For this indicator we report data using the Single Item Measure for Physical Activity and the original 'presence of route' question from the earliest year. In both cases, data from an aggregated set of surveys is used. Also, for the Single Item Measure for Physical Activity, we use the data from individual sites as the basis for case studies.

Route user intercept surveys

Aggregate data from route user intercept surveys conducted in 2009 and 2010 showed that 46.7% of respondents had undertaken at least 30 minutes of physical activity on five or more days in the previous week. The figure for 2009 was 49.3% of users had undertaken at least 30 minutes of

physical activity on five or more days in the previous week (based on nine survey sites). In 2010 this figure decreased slightly to 44.4% of users (based on 10 survey sites). The disparity is explained by the fact that the sample of sites is different in each case, rather than being reflective of any emerging trend.

There are some distinct differences in the 2010 data set between the characteristics of those who do take activity on five or more days per week, relative to those who do not. A greater proportion of those who are active are male, and there are marked differences in the age distribution. A notably higher proportion of those not sufficiently active are starting to cycle again or are occasional cyclists. The proportion of respondents who are active that are commuting is twice as high as that for those who are inactive. This is shown in table 2-3.

Table 2-3: Differences between active and insufficiently active respondents to route user intercept surveys

Percentage of respondents who are:	Doing 30 mins of physical activity on five or more days in the previous week: Active	NOT doing 30 mins of physical activity on five or more days in the previous week: Insufficiently active
Male	67.1%	51.9%
Female	32.9%	48.1%
16-24	5.0%	8.0%
25-34	17.4%	22.0%
35-44	34.1%	24.8%
45-54	17.3%	17.5%
55-64	22.5%	15.5%
65+	3.7%	12.4%
Commuting	49.4%	21.5%
Excellent or very good reported health over the past four weeks	76.7%	58.4%
Cyclists only: new to cycling, starting again, occasional cyclist	11.7%	22.0%

Case studies

The route user intercept survey conducted in Dyce, Aberdeen (part of NCN National Route 1, the Coast and Castles Route), showed that 68.6% of users had done 30 minutes of physical activity on five or more days in the previous week.

A route user intercept survey in Portnacroish, Appin (part of NCN National Route 78 a popular tourist route) was conducted in August and September 2010. 60.0% of users surveyed reported that they had done 30 minutes of physical activity on five or more days in the previous week.

A route user intercept survey at Bell's Bridge, Glasgow (part of NCN National Route 7) was conducted in August 2010. 54.1% of users surveyed reported that they had done 30 minutes of physical activity on five or more days in the previous week.

The least amount of exercise recorded on any of the route user intercept surveys was on the Leith to Seafield Canal route in Edinburgh, where only 13.2% of respondents had done 30 minutes of physical activity on five or more days in the previous week.

2.4 Change in usage on short links

Key performance indicator 4: increase usage on short links by a minimum of 10%

On Tackling the School Run and Short Links schemes carried out between 2008 and 2010, the estimated annual usage increased by 49% from 1.8 million to 2.7 million trips where these interventions were delivered.

Summary

- the aggregate estimated annual usage on links has increased by 49%, from 1.8 million to 2.7 million trips post intervention
- examples of usage increases on links include 3% at Peffermill Road, Edinburgh, 432% at Rosebank, Falkirk and 27% at Annan Academy, Dumfries.

Approach

The short links programme was originated by Sustrans in 2006 and is designed to support initiatives by local authorities that encourage more pupils to walk and cycle on the school journey. In Scotland these were known as 'Tackling the School Run' schemes from 2008 – 2009, and 'Short Links' schemes in 2010.The programme is primarily delivered in partnership with local authorities, through the network of School Travel Coordinators. Route user intercept survey and automatic count data have been used to monitor the schemes.

KPI 4 is assessed using a derivative of the Scottish inputs to the National NCN overall usage model, using short link type routes only. Data is also drawn from route user intercept surveys and continuous cycle count data on short link routes.

Estimate of annual aggregated usage

The overall estimated annual usage has increased from 1.8 million to 2.7 million trips following the intervention. This represents an overall 49% increase.

Examples drawn from route user surveys

Between 2008 and 2011, route user intercept surveys have been carried out at 28 individual sites, of which 25 had at least one post-intervention survey. The annual usage estimates at three route user intercept survey sites at which repeat surveys have been undertaken in 2010/11 are presented in Table 2-4.

Table 2-4: Annual usage estimates on short links routes 'pre' and 'post' surveys

	Overall AUE			Cycling AUE			Pedestrian AUE			Children AUE		
Route user intercept survey site – repeats prior to 2010	Pre	Post	% change	Pre	Post	% change	Pre	Post	% change	Pre	Post	% change
Bathgate	51,248	63,112	23%	8,649	2,015	-77%	42,388	44,972	6%	18,952	10,594	-44%
East Linton, East Lothian	145,891	259,808	78%	13,084	18,568	42%	130,037	226,708	74%	113,197	132,406	17%
Lenzie, East Dunbartonshire	30,046	63,305	111%	3,748	3,225	-14%	25,151	58,658	133%	3,236	13,069	304%
Hailes Quarry, Edinburgh	35,027	45,169	29%	458	1,376	200%	34,111	34,872	2%	4,793	7,924	65%
Balgay Park	188,777	155,072	-18%	6,352	6,809	7%	174,553	144,092	-17%	20,183	15,741	-22%
Castlehead, Renfrewshire	147,889	240,638	63%	5,237	4,374	-16%	182,778	121,641	-33%	4,222	58,384	1283%
Dumbarton, West Dunbartonshire	124,235	434,026	249%	8,362	35,524	325%	113,821	387,158	240%	68,952	238,284	246%
Earl Grey	124,314	133,328	7%	64,362	27,796	-57%	57,613	102,602	78%	14,736	12,400	-16%
Linlithgow, West Lothian	100,009	143,747	44%	2,632	9,983	279%	97,377	131,558	35%	40,783	85,038	109%
Mauricewood	127,093	219,830	73%	2,005	2,482	24%	117,408	205,549	75%	64,781	109,536	69%
St Joseph's, Milngavie	48,006	137,533	186%	866	8,345	864%	47,140	122,736	160%	14,453	71,262	393%

	Overall AUE			Cycling AUE			Pedestrian AUE			Children AUE		
Route user intercept survey site – repeats prior to 2010	**Pre**	**Post**	**% change**	**Pre**	**Post**	**% change**	**Pre**	**Post**	**% change**	**Pre**	**Post**	**% change**
Annan Academy	84,878	108,162	27%	7,626	22,604	196%	74,874	79,391	6%	58,787	55,677	-5%
Callander, Stirling	211,119	210,740	-0.2%	6,416	10,712	67%	201,655	196,149	-3%	101,558	77,573	-24%
Denny	41,500	22,802	-45%	667	1,474	121%	39,001	20,846	-47%	7,271	4,564	-37%
Inverkeithing	58,379	57,077	-2%	3,424	8,264	141%	49,687	43,656	-12%	24,298	22,231	-9%
North Inch	47,890	43,981	-8%	3,087	972	-69%	44,507	42,813	-4%	32,565	37,088	14%
Peffermill Road, Edinburgh	57,201	58,735	3%	2,853	6,953	144%	49,000	45,086	-8%	18,045	27,829	54%
Rosebank, Falkirk	26,380	140,324	432%	310	2,479	700%	24,325	136,717	462%	19,105	102,499	437%

Case studies

Several automatic cycle counters have been installed to monitor Tackling the School Run and Short Links schemes. The quantity of data currently available from these is variable, depending upon the date of installation.

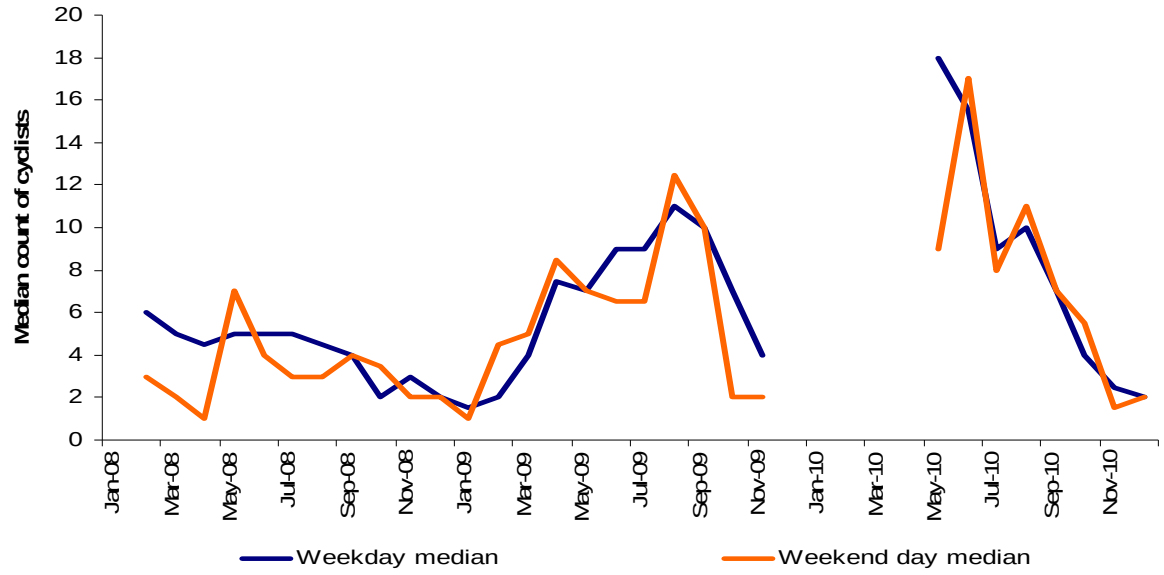
Table 2-5 presents the total number of cyclists counted on weekdays during the months of July and September 2010 for four counters located near Tackling the School Run schemes for which sufficient data are available. Whilst the total count recorded in each month varies substantially between the counters, there is consistently a greater proportion of the total count recorded during school commuting times (7am-9am, 3pm-5pm) in school term time (September) compared to during the school holidays (July).

Table 2-5: Total number of cyclists counted and total counted during school commuting times during July and September 2010

		July 2010	September 2010
Meuse Lane, Annan	Total count of cyclists in month	955	928
	Total count of cyclists in school commuting times	198	211
	% count of cyclist in school commuting times	21%	23%
Hopeman, Moray	Total count of cyclists in month	753	475
	Total count of cyclists in school commuting times	157	118
	% count of cyclist in school commuting times	21%	25%
Caskieberren, Glenrothes	Total count of cyclists in month	61	118
	Total count of cyclists in school commuting times	3	15
	% count of cyclist in school commuting times	5%	13%
Kincaidston, Ayr	Total count of cyclists in month	278	207
	Total count of cyclists in school commuting times	51	65
	% count of cyclist in school commuting times	18%	31%

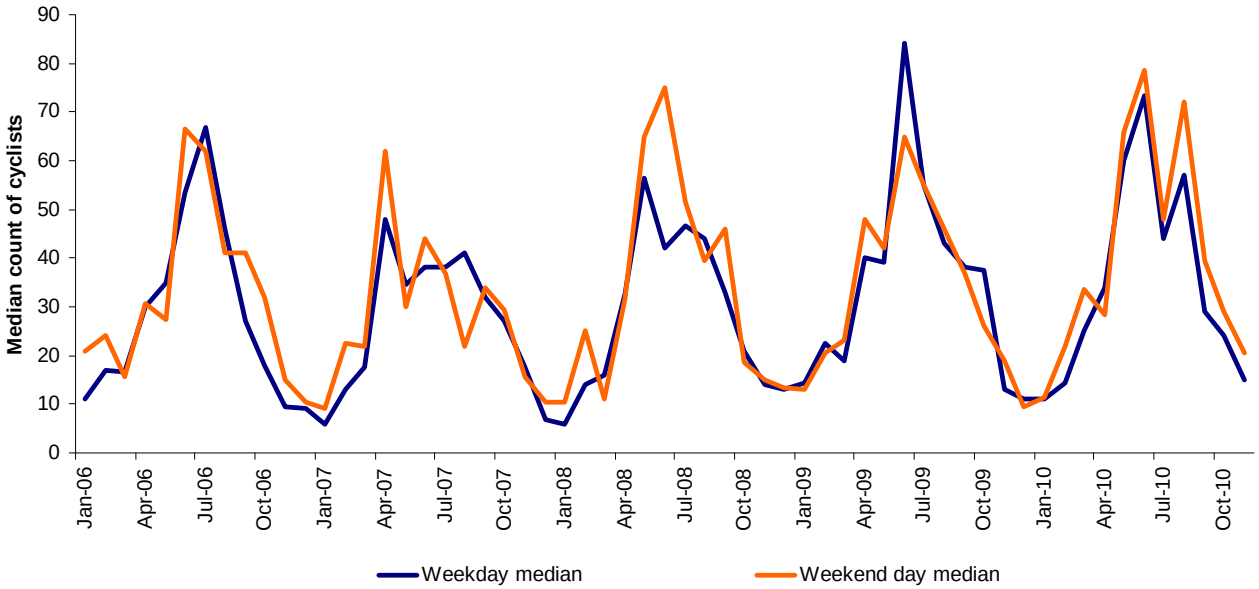
At Kincaidston Primary School in South Ayrshire, a sufficiently long and complete time series is available to permit an estimation of change over time. The median daily count recorded at Kincaidston Primary School is presented in Chart 2-5. While there is a gap in the time series, it still suggests that there is an upwards trend in both the weekday and weekend counts.

Chart 2-5: Daily median count of cyclists recorded at Kincaidston Primary School (weekdays and weekend days)



Five automatic counters were installed in 2010 to monitor the Short Links schemes. It is too early to be able to assess any data that these counters may have provided; however there are data available for existing cycle counters located close to these interventions. For example, the counter at Brougham Street in Greenock, Inverclyde, is located on NCN National Route 75, one kilometre to the north of a Short Links site. Chart 2-6 shows the daily median count of cyclists recorded since 2006. The average annual change in the daily median count for this site is +5% for both weekday and weekend day data.

Chart 2-6: Daily median count of cyclists recorded at Brougham Street, Greenock (weekday and weekend day)



2.5 Commuting trips on the National Cycle Network

Key performance indicator 5: increase in commuting trips on the National Cycle Network by 15%

In 2010, 35% of all users interviewed on the National Cycle Network were commuting. Although there is wide variation in the proportion of commuters recorded, from few or none, to around 50%, there is evidence of strong growth in commuter numbers from several key routes in large and smaller towns and cities, on well-used and less heavily used routes.

Summary

- 35% of all users surveyed on the National Cycle Network in 2010 were making commuting trips
- much lower proportions of commuters were recorded in earlier years, but this is reflective of the sample of sites surveyed rather than a trend
- some route user intercept survey data collected at multiple times, sometimes before and after the delivery of infrastructure projects, show marked increases in commuting
- a number of automatic cycle counters record peaks in levels of cycling at the times of day associated with commuting trips
- there are insufficient data available to detect significant changes in the hourly distribution of cyclists.

Approach

KPI 5 is assessed primarily using route user intercept survey data and analysis of continuous cycle count data.

Route user intercept surveys

Across all surveys conducted during 2008, 3.7% of all users of the NCN were commuting, and the equivalent figure for 2009 was 5.5%.

Data collected from eight surveys conducted on the National Cycle Network in 2010 have been aggregated. From the aggregated dataset it was found that 35% of all users reported that they were commuting. This figure is substantially higher than has been reported in previous years; however caution is required before interpreting causality. The exact reason behind the increased proportion of commuting users observed between survey years is unclear but there are a number of potential factors, including, but not limited to:

- **Location of the survey sites.** Survey sites in each year from 2008 to 2010 vary considerably. In 2010, more surveys were conducted in high-density urban areas than in 2008 and 2009. Where surveys are conducted will have an effect on the profile of the user.
- **Survey timeframe.** In Scotland, most surveys over the past three years have been conducted over 12 hours between 0700 and 1900 hours. However, some earlier 'baseline' surveys were conducted over a 10-hour period between 0730 and 1730 hours. The 10-hour survey period is more likely to omit users using routes for commuting
- **Weather.** Scotland suffered two significant periods of snowfall in 2010 which would have been more of a deterrent for leisure cyclists, and may in some instances lead to an increase in the proportion of users commuting.

Ten sets of baseline and follow-up route user intercept surveys on the National Cycle Network are reported in table 2-6, each with a notable proportion of commuters, annual estimates of commuters, and counts of commuters in 'standard' commuter periods (see footnote below table). Of these pairs, seven show an increase in the proportion of commuters using the routes, in each case greater than 15%.

Table 2-6: Proportion of commuting trips reported at route user intercept surveys[1]

Survey site	Year	% of survey respondents reporting a commuting trip	Number of people travelling during key commuting periods	Estimated annual commuter user total	Year	% of survey respondents reporting a commuting trip	Number of people travelling during key commuting periods	Estimated annual commuter user total	Scheme	Site description	Percentage change
Bathgate, West Lothian	2007	10.6%	28.0	5,432	2009	40.6%	56.0	25,623	Tackling the School Run	Link to NCN 75 – urban traffic-free	↑ >15%
St Catherines, Perth	2008	32.5%	422.5	92,996	2009	19.0%	377.5	68,664	Active Travel	Urban traffic-free	↓
Bells Bridge, Glasgow	2007	31.3%	424.0	45,677	2010	48.2%	512.0	92,572	-	NCN 7 – Urban traffic-free	↑ >15%
Cullen, Moray	2007	7.8%	10.5	2,230	2010	0.5%	40.0	220	-	Near NCN1 – urban traffic-free	↓
Dumfries Railway Path	2006	0.0%	42.5	0	2010	13.8%	41.0	5,940	-	NCN7 – Urban traffic-free	↑ >15%
Dyce, Aberdeen	2006	36.5%	30.5	11,337	2010	28.0%	31.0	10,396	-	NCN1 – urban traffic-free	↓
Union Canal, Edinburgh	2006	10.5%	205.5	28,474	2010	41.0%	532.5	195,040	-	NCN75 – urban traffic-free	↑ >15%
Bridge St, Callander	2009	0.0%	65.0	0	2009	6.5%	102.0	13,698	Tackling the School Run	NCN7 – urban traffic-free	↑ >15%
Dingwall to Invergordon	2007	50.0%	0.5	1,135	2009	25.9%	7.5	5,037	Tackling the School Run	Near NCN1 – rural road	↑ >15%
Dumbarton	2007	9.2%	34.5	11,430	2009	10.5%	325.5	45,573	Tackling the School Run	NCN7 – urban traffic-free	↑ >15%

[1] The '% of survey respondents reporting a commuting trip' column records the percentage of respondents who stated their travel intentions as travelling to or from their place of work and then also presented as a total figure in the estimated annual commuter use. The 'Number of people travelling during key commuting periods' columns records the average number of route users counted during the commuting periods of 0700h – 0900h and 1600h – 1800h (except 2007 Tackling the School Run data which records trips from 0730h – 0900h and 1600h – 1800h) – these individuals *may not be commuters*.

The magnitude of the change in the proportion of users using the route for commuting from pre-surveys varies considerably across the 12 survey sites; there is no overarching pattern that could describe commuting in Scotland. This could be symptomatic of the variation in the sample of sites surveyed.

Data on commuting from automatic cycle counters

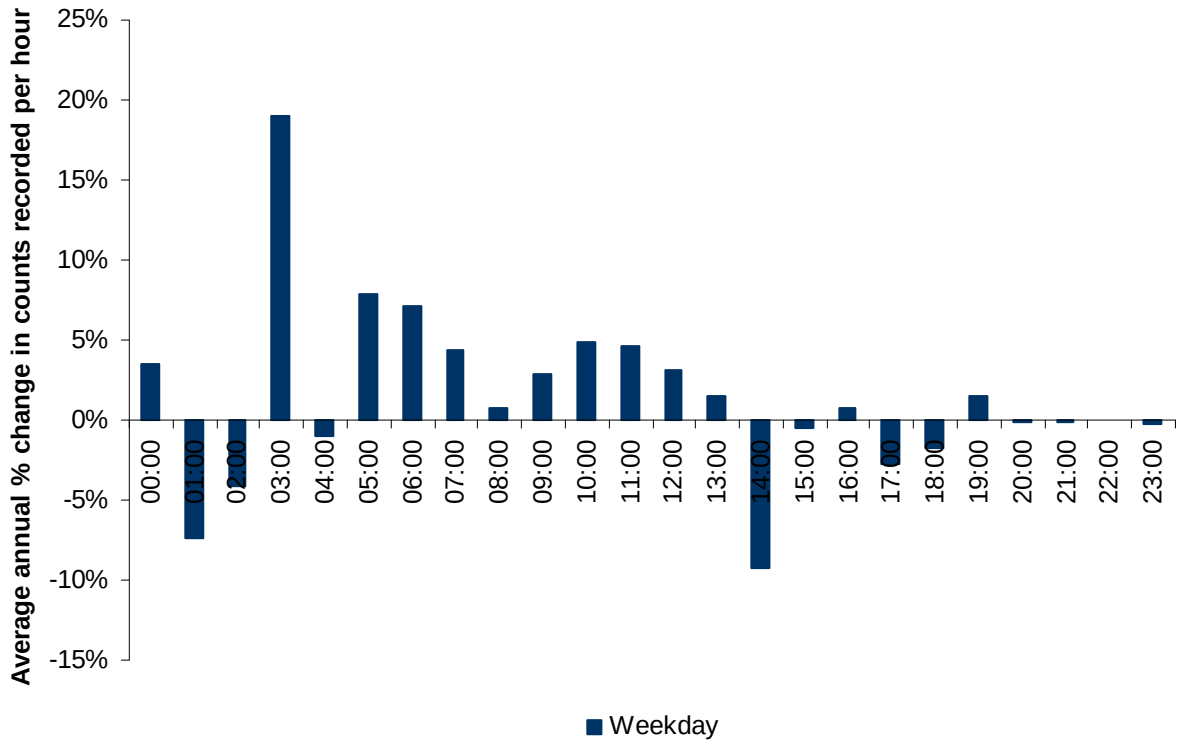
Analysis of automatic cycle counter data can indicate when counts of cyclists usually peak at times associated with the commute to work. The times of day with which growth in cycling are most strongly associated may be estimated where a sufficiently long time series of data are available.

Case study: Hepburn Gardens, St Andrews

A total of 53 months of data are available for the cycle counter located along Hepburn Gardens in St Andrews. This route runs adjacent to a main road and forms part of NCN National Route 1, close to the University of St Andrews. The median number of cyclists counted per day at this location is 292 on weekdays, compared to 179 on weekend days. On the basis of the data available, the annual increase in the average count per day is +3.5% for weekdays, compared to an increase of +0.6% for weekend days.

Chart 2-7 below shows the annual average percentage change in the count recorded at this location in each hour of the day, indicating change across the day but particularly in the mornings, although not necessarily during traditional commuter times.

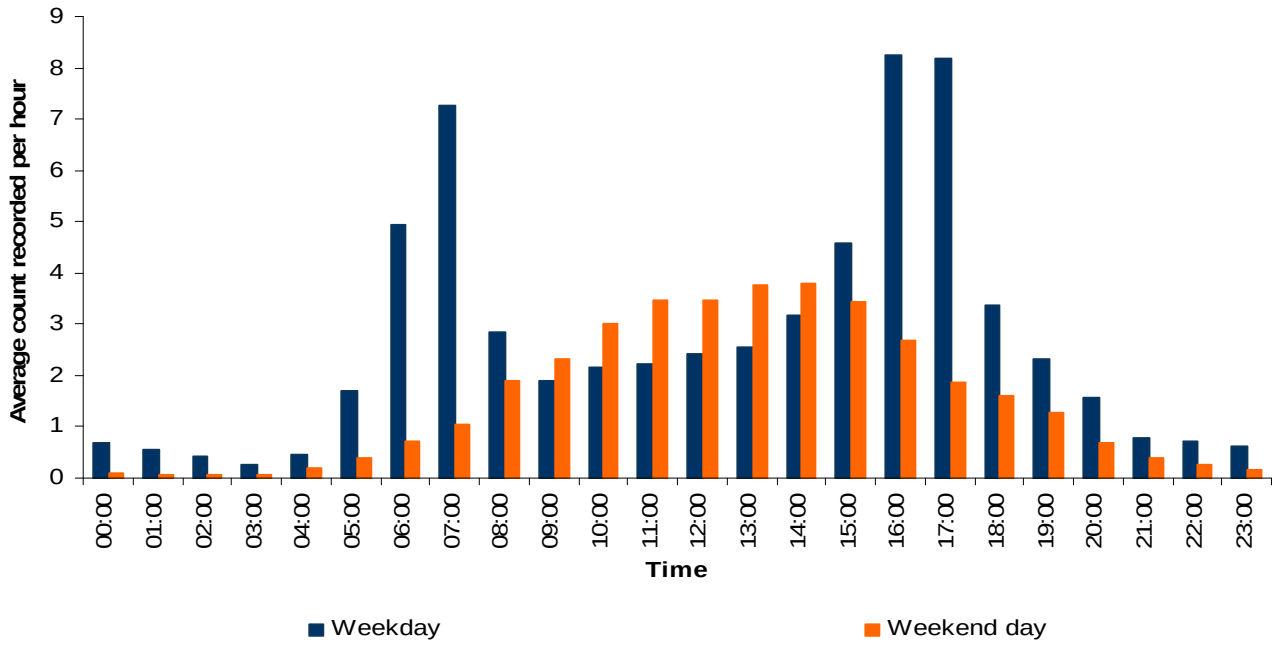
Chart 2-7: Annual average percentage in the count of cyclists recorded at Hepburn Gardens, St Andrews during each hour of the day



Case study: Elgin to Lossiemouth

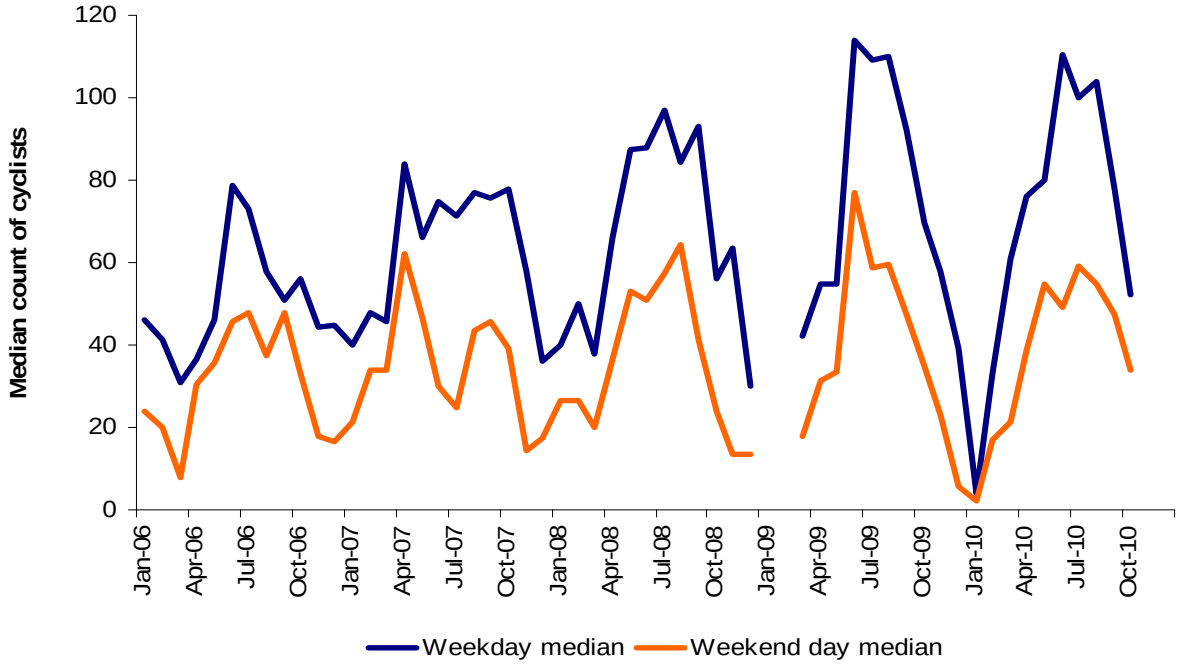
The average count per hour recorded on the cycle route between Elgin and Lossiemouth is presented in Chart 2-8. Although the numbers of cyclists recorded at this site are generally low, on weekdays a peak in the count of cyclists per hour is observed around the key commuting periods. These peaks are not observed in weekend day data which instead indicate a gradual increase in counts recorded towards the middle of the day followed by a decline.

Chart 2-8: Average count per hour recorded on the Elgin to Lossiemouth route



The median daily count recorded by the same counter is presented below. Whilst more cyclists are recorded by this counter on weekdays compared to weekend days, the data suggest an upward trend in the both the weekend and weekday count. The average annual change in the weekday only daily median count for this site is +8.0%, and +2.5% using weekend day only data.

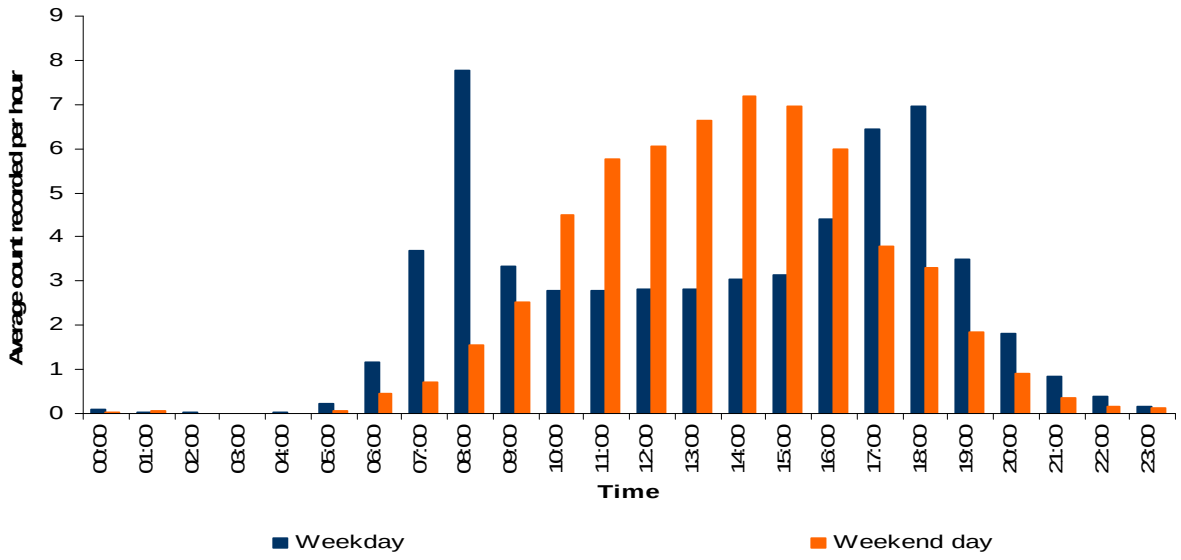
Chart 2-9: Daily median count of cyclists recorded on the Elgin to Lossiemouth route (weekdays and weekend days)



Case study: Tayport, Tay Road Bridge

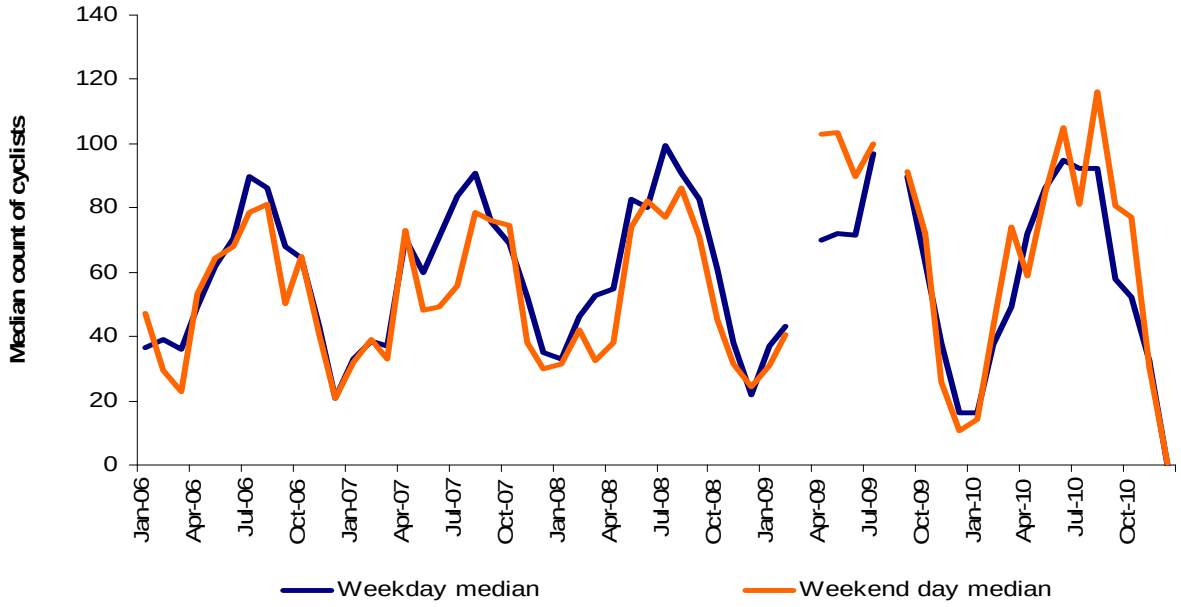
By comparison data from Tayport, Tay Road Bridge presented in Chart 2-10 does not show such a marked differentiation between weekday and weekend use with peaks in both commuter periods during the week and leisure during the weekends.

Chart 2-10: Average count recorded per hour Tayport Tay Road Bridge



The average annual change in the daily median for this site, as presented in Chart 2-11, is +0.8% for weekdays and +4.6% for weekends.

Chart 2-11: Daily media count of cyclists recorded Tayport Tay Road Bridge (weekday and weekend)

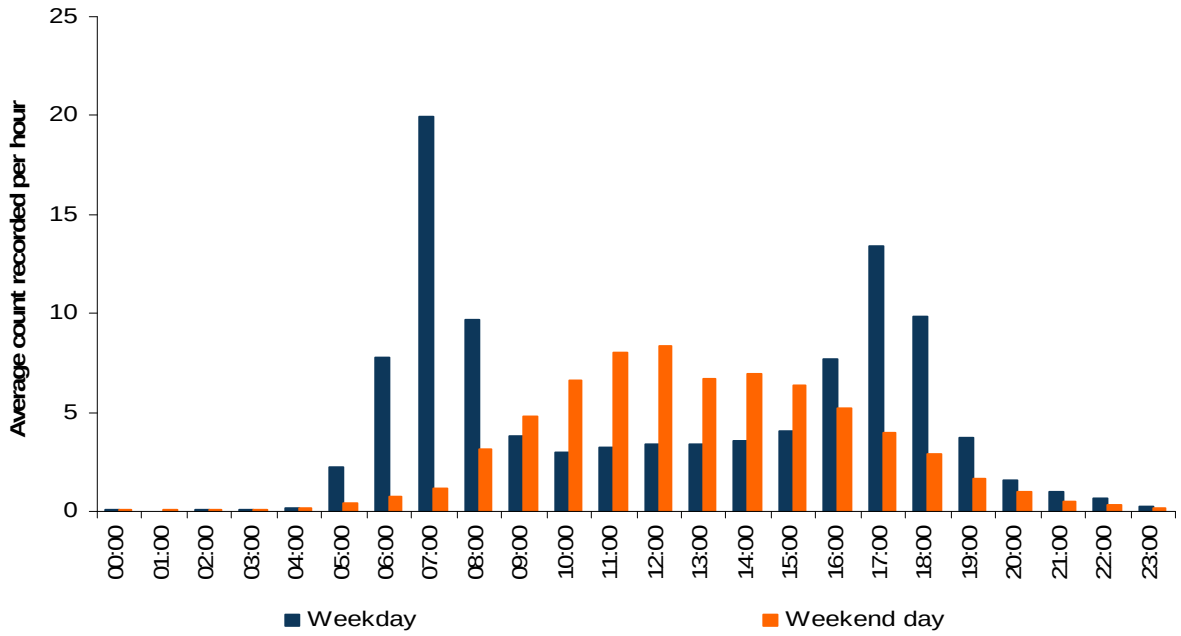


Case study: Forth Road Bridge

A total of 45 months of data are available for the cycle counter located on the Forth Road Bridge Southbound up until the end of 2009. This route runs adjacent to the main road across the bridge and forms part of National Route 1. The median number of cyclists counted per day at this location is 97 on weekdays, compared to 61 on weekend days. On the basis of the data available, the average annual increase in the count recorded per day is 8% for weekdays, compared to an increase of 16% for weekend days.

Chart 2-12 below shows the average count recorded in each hour of the day, indicating that the greatest usage during weekdays occurs at morning and evening commuting times.

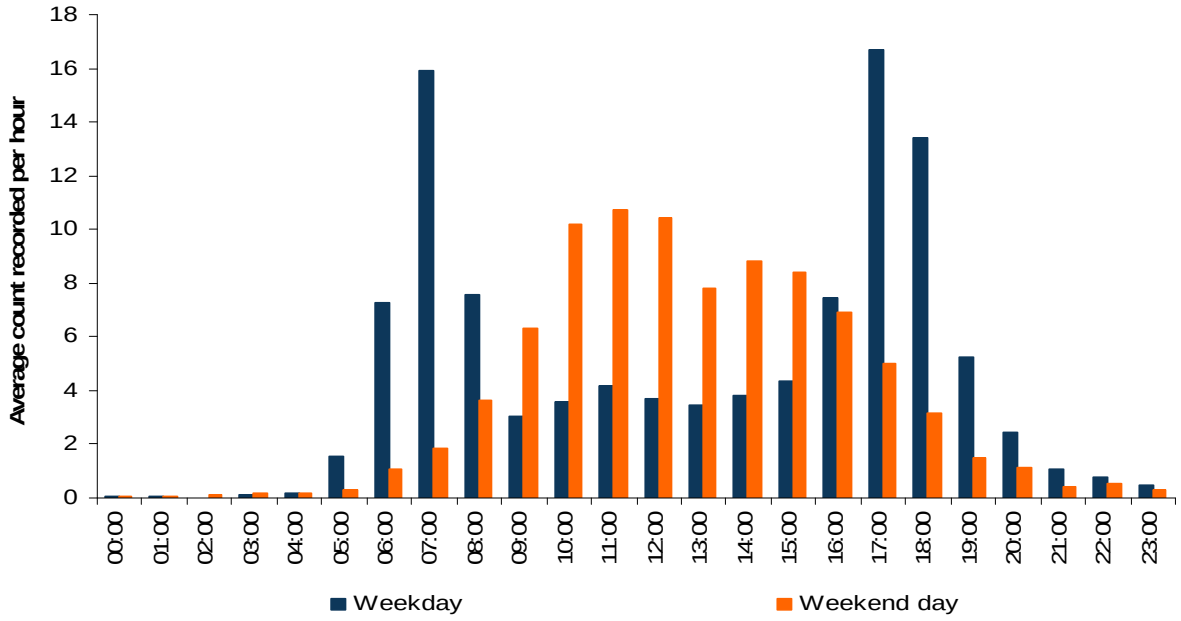
Chart 2-12: Average count of cyclists recorded at the Forth Road Bridge Southbound, attributable to each hour of the day 2006-2009



Infrastructural works have meant that the southbound side of the bridge has been inaccessible for most of 2010. Data from the counter located on the northbound route over the bridge suggests the transfer of cyclists to this route during the disruption to the southbound route.

Chart 2-13 shows the average count recorded per hour during 2010. The distribution pattern is very similar to the counts on the southbound side of the bridge, although the counts recorded at the evening commuting time match more closely than those recorded in the morning than at the southbound location.

Chart 2-13: Average count of cyclists recorded at the Forth Road Bridge northbound, attributable to each hour of the day 2010



2.6 Car usage and CO_2 emissions

Key performance indicator 6: reduction in trips made by car and saving in CO_2 emissions

27% of pedestrians and 33% of cyclists said that they could have used a car to make their trip instead; if all estimated cyclist and pedestrian trips on the NCN replaced car journeys, the potential carbon dioxide saving is estimated at 46,400 tonnes. Petrol savings would exceed 19 million litres, valued at over £22 million.

Summary

- 27.0% of pedestrians and 33.0% of cyclists said that they could have used a car to make their trip instead of walking or cycling
- the estimated CO_2 savings vary across the survey locations
- the greatest improvement in CO_2 savings on an individual route was at Mauricewood, Midlothian, where there was a change in CO_2 savings of 11.4 tonnes
- a possible scenario of a 7% reduction in car trips in Kirkcaldy would result in 62.0 tonnes of CO_2 savings per year

Approach

In KPI6 carbon dioxide savings are estimated across the National Cycle Network in Scotland based on high level assumptions that all walking and cycling trips on the Network all replaced car journeys. This section also makes use of data collected where survey respondents have specified that walking and cycling have actually replaced car use.

Reported car trip displacement

18.8% of survey respondents who were cycling in 2008 said that they could have used a car but chose not to. 9.7% said that the use of a car was not an available option for them. The equivalent figures for pedestrians were 6.8% and 2.3%. In 2010, the emphasis of the question was changed (in line with the recommendations of the iConnect research consortium), specifically 'Which other modes of transport could you have used to make today's journey?'. 27.0% of pedestrians and 33.0% of cyclists said that they could have used a car instead. 33.3% of pedestrians and 41.5% of cyclists would not have made their trip at all.

Potential carbon savings

If all estimated cyclist and pedestrian trips on the National Cycle Network replaced car journeys, the potential carbon dioxide saving is estimated at 46,400 tonnes. Petrol savings would exceed 19 million litres, valued at over £22 million.

Realised carbon savings

As part of the 2010 interim report, route user intercept surveys used during the monitoring of the National Cycle Network and Tackling the School Run scheme provided data used to estimate carbon dioxide (CO_2) savings. Survey data from nine survey sites were used to estimate the number of car trips replaced by people choosing to make journeys by non-motorised modes rather than car. The estimated CO_2 saved ranged from three tonnes per year to 116 tonnes per year.

This year the methodology to calculate CO_2 emissions will change. The Department for Transport's Basic Local Authority Carbon Tool will be used to estimate changes in savings over time, revisiting the survey sites used in the 2009 report. Due to changes in methodology, the CO_2 savings displayed in this report may be slightly different to those shown in 2009. A case study forecasting potential CO_2 savings resulting from a town-wide intervention in Kirkcaldy is also included in this year's report.

Data analysis

Route user intercept surveys have been performed to monitor cycle routes and Sustrans' projects in Scotland. Data collected through the surveys concerning car use are combined with the annual

usage estimate of the route to establish an estimation of the potential carbon dioxide (CO_2) saving from journeys.

The key variables in the calculation are:

- the estimated annual use of the route at the site at which the survey was performed
- the proportion of the estimated number of total users not using a car to make their journey
- the proportion of the estimated number of users who did not use a car for any part of their journey who could have used a car for their journey. These users show the potential for CO_2 savings.
- the median distance travelled using non-motorised transport by those surveyed at that site

These data were used to calculate input values to the Department for Transport's Local Authority Basic Carbon Tool[2] which uses a number of preset parameters to calculate annual reductions in CO_2 emissions. Whilst this approach does not generate a network wide estimate of savings, it is based on data collected where Sustrans interventions have been delivered. Table 2-7 shows the estimated carbon dioxide savings, along with the average number of trips and trip distance at each RUIS site used to derive inputs to the model. The figures generated range from no change (even an increase in emissions at one site where usage decreases), to over 11 tonnes per year at one site.

[2] Department for Transport, 2011, "http://www.dft.gov.uk/pgr/regional/policy/carbon-tool/", Accessed 9 June 2011

Table 2-7: Data used to derive input to the Department for Transport's Local Authority Basic Carbon Tool, and estimated carbon dioxide savings

	Annual usage estimate (adults)		Trip length (km)		% not using a car for any part of their journey		% who could have used a car but chose not to		Daily number of car trips replaced by active modes		CO_2 saved t yr^{-1}		
Survey	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Change in saving**
East Linton, East Lothian	32,694	121,906	1.6	0.8	85.2	100.0	34.0	26.6	43	147	2.6	4.5	**1.9**
Hailes Quarry park	34,498	29,172	1.6	1.6	87.7	95.8	17.5	19	24	24	1.5	1.5	**0.0**
Balgay, Dundee	168,594	139,331	2.4	2.4	45.8	46.0	18.2	23.5	64	69	5.8	6.2	**0.4**
Earl Grey, Dundee	109,578	120,928	3.2	3.2	81.3	66.9	51.0	68.2	207	251	25.0	30.0	**5.0**
Linlithgow, West Lothian	53,273	58,709	0.5	0.8	99.5	88.1	58.8	60.7	142	143	2.7	4.3	**1.6**
Mauricewood, Midlothian	62,312	110,294	1.6	1.6	79.1	83.0	24.4	58.5	55	243	3.3	14.8	**11.4**
Inverkeithing High School	34,081	34,846	3.2	3.2	96.4	92.7	25.6	25.6	38	38	4.6	4.6	**0.0**
Callander, Stirling	109,561	133,167	1.2	2.8	73.1	49.7	37.5	40.8	137	123	6.2	13.0	**6.8**
North Inch/Bute Drive, Perth	15,325	6,893	2.4	2.4	100.0	95.1	35.0	23.2	24	7	2.2	0.6	**-1.6**
Denny, Falkirk	16,040	16,216	1.6	1.6	98.6	100.0	16.3	17.9	12	13	0.7	0.8	**0.1**

Case Study: Kirkcaldy

Sustrans is working in partnership with Fife Council and the Scottish Government to improve walking and cycling routes in Kirkcaldy. A household travel behaviour survey and travel diary was completed in 2010 to provide extensive baseline data about the travel activities of the residents of the town. Whilst a detailed assessment of the CO_2 savings cannot be made without the findings from the post intervention survey that will follow this project, some cautious estimations can be made surrounding the potential CO_2 savings possible in Kirkcaldy.

The travel diary aspect of the household behaviour survey recorded 10,697 individual trips. Each respondent was asked if, for any non-car journey, a car could have been used instead. With this information we can apply a similar methodology as used above to estimate CO_2 saved by those journeys. The non-motorised trips made in Kirkcaldy, for which a car could have been used instead, represent an estimated saving of 221 tonnes of CO_2 per year (5.6kg per capita).

Following completion of the project, a follow up travel behaviour survey and travel diary will provide data for a robust estimation of the levels of CO_2 savings from journeys but, as an interim measure, we can use estimations based on expected levels of reductions in car use, to provide scenarios of potential CO_2 savings in Kirkcaldy.

The average annual number of trips and average trip length in Kirkcaldy, as discussed above, was used as a baseline value in the Department for Transport's Local Authority Basic Carbon Tool. This represented the 'Pre' situation in the scenarios tested. The 'Post' number of trips per year was simply a reduction in the baseline figure in each scenario by 4%, 7% and 10% respectively. The Sustainable Travel Towns projects that were carried out in partnership with Sustrans have recorded a reduction in car trips of between 7% to 10%[3]; therefore 7% was used as a mid-range scenario and two alternative but realistic extremes were included for comparison. A summary of the change in annual car trips in each scenario and the resultant annual CO_2 savings is shown in Table 2-8.

Table 2-8: Summary of Carbon Tool inputs and outputs for Kirkcaldy case study

	Pre car trips per year (based on 2010 travel diary)	Post car trips per year	Yearly reduction in number of car trips	CO_2 (t year^{-1}) attributed to car trips		Potential CO_2 savings (t year^{-1})
				Pre	Post	
4% scenario	3,234,144	3,104,778	129,360	887	851	35.4
7% scenario	3,234,144	3,007,754	226,390	887	825	62.0
10% scenario	3,234,144	2,910,730	323,400	887	798	88.6

[3] Department for Transport, 2010, 'The Effects for Smarter Choices Programmes in the Sustainable Travel Towns: Full Report' (http://www.dft.gov.uk/pgr/sustainable/smarterchoices/smarterchoiceprogrammes), accessed (9 June 2010). Reduction in car trips was recorded between 2004 and 2008 as:

- Worcester – 8% reduction
- Peterborough – 8% reduction
- Darlington – 7% reduction

2.7 Tourism revenue to the area and local communities

Key Performance Indicator 7: increased tourism revenue to the area and local communities

An *indicative estimate* of the value of the NCN to the Scottish economy in terms of spend by recreational and touring cyclists is almost £100 million per annum; two case studies show marked uplift in the spend associated with particular routes, and a number of other cases estimate the value of economic activity but without a second time point to generate a change value.

Summary

- tourism revenue at a specific site, based on survey responses and manual cycle counts at that site, can be estimated using the Cycle Route Economic Impact Model
- annual spending by recreational cyclists and cycle tourists using the National Cycle Network at the route user intercept survey site at Ballachulish increased from £85,053 in 2008 to £110,899 in 2011
- this growth is based on observed increases in total cycle usage and in cycle tourism recorded at the site
- spending levels for other route user intercept survey sites are calculated and some conservative estimations of growth are made based on general increases in cycle usage.
- if sufficient data are available changes in tourism revenue over time can be estimated
- applying the model to the data for the whole NCN generates an *indicative estimate* of the value of the NCN to the Scottish economy in terms of spend by recreational and touring cyclists of almost £100 million per annum

Methodology

Sustrans has recently completed development of the Cycle Route Economic Impact Model to estimate the economic impact of cycle tourism. This builds on work previously published in 2007 estimating the economic impact of cycle tourism in the North East of England. In addressing this KPI, the model will be used to estimate tourism impact at several individual sites on routes attracting tourist use in Scotland.

The model uses information on the number of tourist groups using a cycle route and the characteristics of these groups to estimate the economic impact. The required data are:

- average trip duration
- average group size
- percentage of leisure/recreation cyclists who are tourists
- annual usage estimate by leisure/recreation cyclists

Tourists in this instance are defined as cyclists staying overnight for at least one night at a holiday base. Using route user intercept surveys as a source, the number of tourists is based on the percentage of recreational cyclists using a route who are staying in accommodation, or a holiday base, overnight for one or more nights. Non-tourists are referred to as home-based users.

The output from the model is presented in terms of total spending by leisure and touring cyclists using the route and spending per cyclist.

Evidence of increased tourism revenue from route user intercept surveys: Ballachulish

Route user intercept surveys were carried out at Ballachulish, on National Cycle Network route 78 between Oban and Fort William in 2008 and 2011 as part of Sustrans' monitoring of the National Cycle Network in Scotland. Table 2-8 displays the inputs from each survey which were used in the Cycle Route Economic Impact Model. The estimated annual usage estimate for cyclists is first adjusted to reflect the proportion of recreational cyclists, and then further adjusted for those

reporting to make 'there and back' trips, to give an estimate of the number of individual cyclists passing the survey location.

Table 2-8: Summary of inputs for Ballachulish tourism revenue estimate

Inputs	2008	2010
Average duration (hours)	0.9	1.8
Average group size	2.0	2.0
Annual cyclists usage estimate	7,202	6,992
Percentage of cyclists who are recreational users	90.9%	92.8%
Percentage of recreational users making 'there and back' trips	32.3%	20.3%
Annual estimate of individual recreational cycling trips	5,490	5,831
Percentage of recreational cyclists who are tourists	27.4%	44.4%

Table 2-9 displays changes in tourist revenue at Ballachulish both in terms of total spending, and spending per cyclist.

Table 2-9: Summary of Ballachulish tourism revenue estimate

Output	2008 revenue	2010 revenue
Annual tourist users spending	£45,075	£78,107
Annual home-based users spending	£39,979	£32,793
Total spending	£85,053	£110,899
Tourist users daily spend per head	£30.07	£30.17
Home-based users daily spend per head	£10.02	£10.12
Average spend per head on route	£15.49	£19.02

In 2008, an estimated 1.4 full time equivalent jobs sustained by tourism, compared to 1.8 jobs in 2011.

Estimation of potential tourism revenue increases at other route user intercept survey sites

Several other route user intercept survey sites on the National Cycle Network in Scotland have been identified as being on key tourist routes. Only a selection of these have sufficient data to estimate tourism revenue, and only Ballachulish (above) had sufficient data to carry out an assessment of change in revenue over time. This is a result of changes to the design of the surveys, questions and

the data captured, which renders the majority of recent surveys unsuitable for the Cycle Route Economic Impact Model. Thus for some sites where there has only been one survey providing the required data it was only possible to estimate tourism revenue for the year of the survey only. A selection of these can be seen below in Table 2-10.

Table 2-10: Tourism Revenue at selected locations

Route user intercept survey site	Annual tourist spending	Annual home-based spending	Total annual spending
Boat of Garten (2008)	£279,674	£89,952	£369,626
Newtonmore to Kingussie (2005)	£343,197	£26,558	£369,754
Deeside, Mannofield (2005)	£23,931	£103,213	£127,143
Carnoustie (2008)	£50,171	£54,389	£104,560

Case study: Ganavan

For one location, Ganavan, there has been a comparison survey which does not provide the necessary data for the model, but does allow us to observe changes in general cycling. For this example (discussed below) two estimations of change in tourism revenue have been made based on growth in general cycle usage on the route, and recreational cycle usage on the route only rather than specifically tourist usage.

The route user intercept survey site is situated in the settlement of Ganavan to the north of Oban. It is located on the National Cycle Network National Route 78, which forms part of the Oban to Fort William route.

Route user intercept surveys were carried out at Ganavan in 2008 and 2009, with only the 2008 data being suitable to estimate revenue using the model. The 2009 survey showed that the annual usage estimate for all cycling at the site increased by 10.7% from 2008 to 2009, which was used to estimate change in recreation and tourist usage.

Keeping all other inputs the same the annual usage estimate for tourist users was increased by these two percentages to give a lower and higher estimate for increased revenue from 2008 to 2009. These estimates of growth in tourism revenue are summarised in Table 2-11. As the proportions of tourist users, group size and trip duration are all kept constant the spending levels per head remains the same at £28.94 for tourists and £8.88 for home based users with an average spend of £12.35 per recreational cyclist. This could be considered a conservative estimate as it assumes no growth in the proportion of users who are tourists.

Table 2-11: Forecast growth in tourism revenue at Ganavan

Input	2008 revenue	2009 revenue forecast (based on all cycle usage)
Annual tourist users spending	£21,458	£23,754
Annual home-based users spending	£31,483	£34,852
Total spending	£52,941	£58,606

Estimating the value of leisure and tourism cycling across the NCN in Scotland

Using Sustrans' model for the economic impact of leisure and tourism cycling, it is possible to estimate an *indicative value* to the Scottish economy of the NCN in terms of direct spend by these categories of user. In order to generate this data we have taken the annual usage estimate for cyclists using the NCN in Scotland in 2010. We have adjusted for the proportions of recreational cyclists recorded in the survey as 'leisure users' and 'from holiday base users' (46.8%), and adjusted for the proportion of respondents reporting that they are making out-and-back trips (26.4% in 2008). The mean group size among recreational users is 1.7 people per party, and average trip distance is 24.7km.

The key output figures are:

- Total route spending = £99.6 million
- Spending by tourists = £20.8 million
- Spending by residents = £78.8 million
- Spending per head, tourists = £29.34
- Spending per head, resident = £9.29
- Overall average spending per head = £10.83
- Direct employment = 1,605 full time equivalent posts

This indicative estimate stands up against the Visit Scotland cycling tourism report from 2006; this document states £219 million revenue from cycle tourist activity in Scotland in 2003, £20 million from holiday trips where cycling was the main purpose and £199 million from cycling trips as part of a holiday. The report, citing Sustrans, notes the volume and value of UK cycle day visits and leisure cycling trips for 1997 to be 114 million trips and £455 million spend.

2.8 GAGT! intervention locations

Key Performance Indicator 8: on average, a 10% walking and cycling increase is achieved in the GAGT! intervention locations

An 18% increase (in walking and cycling) was reported in the Get Active, Getting There! (GAGT!) intervention locations in 2008-09. This was the only year the project was implemented.

Summary

The 2009 interim report detailed how the net effect of the GAGT! Intervention has been an overall increase in usage from 433,000 to 509,000 – an 18% increase. There was variation in this though, for example at North Inch usage only changed from 147,000 before to 147,500 after the intervention, compared to St Catherine's which saw a 26% increase from 286,000 to 381,000. The pre-intervention surveys were conducted in October 2008 and the post-intervention surveys in June 2009. Before the intervention, 75% of respondents used no other mode of transport other than walking or cycling to make their trip. This increased to 78% following project delivery.

Data collection ceased for this project upon completion in 2009.

2.9 Relative change in travel models

Key performance indicator 9: relative increase in trips by sustainable travel modes of 12% in target areas and relative reduction of car trips by 10%

Data from Kirkcaldy, Fife, suggests that there is the potential for trips by sustainable travel modes to increase by 26% in target areas, with a corresponding reduction in car trips of 7%.

Summary

- a scenario based approach has been used to estimate the what potential changes in trips by sustainable modes might be expected following the Make Your Move Kirkcaldy project
- a potential 7% reduction in car trips and a 26% increase in trips by sustainable travel modes has been estimated.

Approach

In previous iterations of this report, this KPI has not been addressed due to the complexity of monitoring required. This would have required a detailed pre- and post-travel behaviour survey that was not possible within the specified time frame and budget available for monitoring. However, a delivery project is beginning in Kirkcaldy, Fife, which does include a travel behaviour survey, so in future an assessment of this KPI will be possible, using data collected in Kirkcaldy.

In the meantime some attempt can be made to assess model changes in modal share based on results from the baseline survey that has been conducted in Kirkcaldy.

KPI 6 presented a scenario-based model for the estimated carbon dioxide savings as a consequence of a potential reduction in car use. The yearly reduction in car trips was estimated based on 4%, 7% and 10% scenarios. These figures were based on a comparable study of the Sustainable Travel Towns projects that were carried out in partnership with Sustrans. The same survey can be used to provide a scenario for the potential increase in trips made by sustainable travel. Using the travel diary aspect of the Kirkcaldy household travel behaviour survey conducted in November 2010 to provide a baseline level of trips per year for different travel modes, combined with the potential percentage change in number of trips taken from the Sustainable Travel Towns report, an estimation of the change in the number of trips by car and by sustainable mode has been made.

Results

Data from the Sustainable Travel Towns project suggest that car trips were reduced by between 7% and 10% following the conclusion of the project. The survey also found that between 2004 and 2008, cycle trips per resident of the three towns taken together increased by 26% to 30%, whereas, according to the National Travel Survey, there was a national decline of cycle trips in medium-sized towns over an approximately similar period. The household survey also suggested an increase in walking trips of 11% to 14%.

Table 2-13 below presents a scenario of the estimated relative and absolute reductions of car trips in Kirkcaldy and the estimated increases in sustainable travel modes.

Table 2-13: potential changes in travel modes in Kirkcaldy as estimated from similar findings from the Sustainable travel Towns projects

	Baseline data	Post-intervention scenario	Yearly change in number of trips	Percentage change
Car trips per year	3,234,144	3,007,754	-226,390	-7%
Walking trips per year	114,589	144,382	29,793	26%
Cycling trips per year	3,740	4,151	411	11%
Sustainable trips per year	118,329	148,533	30,204	26%

Future evaluation

On completion of the Kirkcaldy project, a follow-up travel behaviour survey will be conducted to evaluate walking and cycling in the town. With this data a more accurate estimation of the mode share of sustainable trips will be presented. Further travel behaviour surveys in other target areas will be able to provide similar evidence. The monitoring framework and plan that Sustrans have produced for the city of Edinburgh Council's Active Travel Action Plan includes a travel behaviour survey as a component of the preferred option monitoring packages.

2.10 Statistical analysis of data obtained from automated cycle counters

Key performance indicator 10: statistical analysis of data obtained from 25 automated cycle counters

Statistical analysis has been performed using data from 54 automatic cycle counters, 37 were located on the National Cycle Network and 17 on other routes including tackling the School Run and Short Links schemes.

Summary

- 54 automatic cycle counters included in statistical analysis
- annual average change of +3.2% per year on all National Cycle Network sites
- annual average change of +2.4% per year on all sites

Analysis of all available data

The findings for this KPI reported herein are based on the whole time series of cycle counter data available to date and should be considered indicative of the rate of change in levels of cycling across the whole reporting period.

A total of 54 cycle counters with at least six months data for at least three years since 2006 were selected for inclusion in the analysis. Selection of counters was based entirely on the quantity and quality of data available rather than geographical distribution. Of the 54 counters selected, 37 were located on National Cycle Network routes and 17 were at other locations. For 13 counters, no new data had been received since the 2010 iteration of the report, and analysis was repeated using the same data as was available at that time.

Based on the data from the 54 cycle counters, 37 National Cycle Network sites show an annual average change of +3.2%, whilst there was no notable change in the level of cyclists recorded by the 17 located on other cycle routes. Across all counters there is an average annual change of +2.4%. These estimates of percentage change relate only to the individual count locations and do not reflect changes in levels of use across the whole route or network.

Analysis of summer data only

A secondary calculation was made using data collected during summer months only to investigate the effects of the extreme winter weather in recent years on overall trends in cycling.

This analysis use data collected between April and September each year. A total of 38 counters had sufficient data available to allow this analysis; 25 of these were on National Cycle Network routes and 13 were located elsewhere. Based on the data collected during the summer months, the annual average change in the number of cyclists recorded was +5.5% for counters located on the National Cycle Network, +2.4% for the counters located on other cycle routes and +4.4% overall.

2.11 Route user intercept surveys

Key performance indicator 11: minimum of ten route user monitoring surveys

Between 2008-2010, 70 route user intercept surveys have been conducted at 57 sites

Summary

- between 2006 and 2010, 102 route user intercept surveys have been conducted across all projects at 59 different sites
- 12 route user intercept surveys were conducted in 2010; two for Short Links schemes, and ten other route user intercept surveys conducted as part of NCN development.

Progress on data collection throughout the project period

- between 2008-2010, 70 route user intercept surveys have been conducted at 57 sites
- in 2008, 19 route user intercept surveys were conducted at 19 sites
- in 2009, 41 route user intercept surveys were conducted at 37 sites
- in 2010, 10 route user intercept surveys were conducted at 10 sites, plus two surveys on Connect2 schemes
- 30 of those sites are on or near the National Cycle Network
- four of the sites were Connect2 project locations
- 28 of the sites were at Tackling the School Run locations, of which four were also part of the NCN
- two sites were survey in Perth for the GAGT! Project, of which one was also part of the NCN
- surveys were conducted over many parts of the country, but predominantly in central Scotland on urban traffic-free routes.

Data collection in 2010

In 2010 a total of 12 route user intercept surveys were conducted. A total of nine sites were on or near the National Cycle Network.

The following sites were surveyed in 2010 as part of National Cycle Network development:

- Alloway Path, Ayr (link to National Route 7)
- Appin, Benderloch (National Route 78)
- Bells Bridge, Glasgow (National Route 7)
- Cullen Viaduct, Moray (link to National Route 1)
- Culross, Fife (National Route 76)
- Dumfries Railway Path (National Route 7)
- Dyce, Aberdeen (National Route 1)
- Inverdruie (National Route 7)
- Leith (link to National Route 75)
- Union Canal, Edinburgh (National Route 75)

The following sites were surveyed in 2010 to monitor Connect 2 schemes:

- Edinburgh Rd, Dumfries
- South Inch, Perth

2.12 Quantitative and qualitative research including focus groups

Key performance indicator 12: quantitative and qualitative research including focus groups. At least two evidence-based research papers produced in partnership

Qualitative data collection is underway; by July 2011, two evidence based research papers had been produced by Sustrans Scotland in partnership with other organisations; three conference papers have been presented; two research papers have been published by other organisations drawing on the data assembled by Sustrans in Scotland.

Summary

Two evidence based research papers have been published over the period 2008-2011. Findings are emerging from a third research paper commissioned over this period. Three evidence-based conference papers have been presented during 2010-11, and a further two academic papers have drawn on data collected through this work programme. Summaries of these papers are presented in this section.

Additional activity

Sustrans has commissioned an evaluation of its sustainable transport infrastructure surrounding schools in Scotland with the Centre for Local Economic Studies (CLES). This research is producing preliminary findings at the time of writing this report, and is scheduled for publication during the second half of 2011. In addition to this Sustrans is a strategic partner of the Engineering and Physical Sciences Research Council. This involvement has led to two research projects with direct relevance to Scotland. Further details of these research projects are also summarised in this section.

Community, school and workplace initiatives to encourage individuals to use the outdoor environment for physical activity

In 2010, Sustrans Scotland published with the Institute for Social Marketing and the University of Stirling the review report 'Community, school and workplace initiatives to encourage individuals to use the outdoor environment for physical activity'[4].

The aim of the review was "to identify and review evidence of the effectiveness of initiatives and interventions delivered in the community, school, or workplace setting which have been designed to encourage individuals to use their local outdoor environment to increase their physical activity, and to identify and describe similar initiatives currently being delivered in Scotland."

The review included systematic reviews, primary studies and grey literature covering the following areas: active travel interventions, modifications to the physical environment, organisational change interventions, walking groups and programmes, cycling promotion, campaigns and events, and outdoor experience.

Organisational change interventions

- The review provides support for modest playground improvements (for example, coloured paint markings) and for providing additional playground equipment as strategies for encouraging active play. These are relatively simple and low cost replicable interventions. However, effectiveness has not been measured over the longer-term, and it is possible that such interventions may have a novelty effect which wears off over time. The review also found support for introducing play facilitators to encourage children to engage in active play and games, although this strategy may be less effective with girls than with boys.

[4] M Stead, K Angus, R Jepson, A Hughes and C Oram 2010 'Community, school and workplace initiatives to encourage individuals to use the outdoor environment for physical activity (2009/10 RE014)' Final report.

- The review found no support for increasing the number of outdoor activity breaks in the school day, and insufficient evidence for making school playgrounds available out of hours. Taken together, the evidence suggests that simply increasing the amount of time children spend in the school playground is not effective unless the playground experience is enhanced either with improved markings and better equipment or with facilitators to encourage active play.
- The review found support for improvements to workplace facilities such as changing facilities and bicycle storage. However, interventions tend to be multi-faceted, involving several different elements, and it is not possible to identify the contribution of specific elements.

Walking groups and programmes

- The review finds support for walking groups and programmes which are aimed at general populations within a community and for ones which are targeted specifically at inactive populations, primary care populations and older populations. The review also finds support for walking groups and programmes implemented in workplaces.
- There is insufficient evidence of walking programmes targeted specifically at recent mothers.

Cycling promotion

- The review finds insufficient evidence for cycling promotion campaigns (excluding active travel and infrastructure interventions) in the community and in workplaces, but moderate support for cycling promotion campaigns in schools. More research is needed in this area.

Campaigns and events

- The review found support for multi-faceted community-wide campaigns, with some studies measuring impact over several years. The interventions examined above are complex multi-faceted interventions, and this poses challenges for both sustainability and replicability. While the elements in an intervention can in theory be specified and replicated elsewhere, it may be the process by which they are implemented which is key to success.
- The review found insufficient evidence that themed ‘days’ and ‘weeks’ can have an impact on routine physical activity levels, although such events can be effective in stimulating participation and short-term increases in physical activity. The review found insufficient evidence to support challenge events in either community or workplace settings, and insufficient evidence to support mass participation events.

Outdoor experience

- The review found insufficient evidence to support any of the outdoor experience interventions examined. This reflects the fact that outdoor experience interventions have been less well evaluated in terms of impact on physical activity than other types of intervention examined in this review. The bulk of the studies in this area are process evaluations and/or are focused on other benefits, such as wellbeing, learning and mental health. More research is needed to establish how effective these sorts of interventions might be in terms of increasing physical activity.
- Beyond this, there is evidence to suggest that such interventions are appreciated by and acceptable to participants, and are perceived by implementers and others as having the potential to deliver a wide range of benefits, not restricted to physical activity. Some of the interventions examined in the review seem to have the potential to engage vulnerable and marginalised groups who might otherwise have little contact with the natural environment.

Key learning for research commissioners

- More robust evaluation is needed to assess the potential impact on physical activity of 'outdoor experience' interventions such as conservation, therapeutic experience of nature and Forest Schools.
- Studies should consider long-term impact and where possible should incorporate objective methods of assessing physical activity.
- Evaluations should measure reach and uptake among groups most in need of support and encouragement to become physically active, and should analyse whether interventions produce differential effects among key subgroups, including girls and BME groups.

Civilising the Streets

In June 2009, together with Transform Scotland Trust, Sustrans published the report "Civilising the Streets: How strong leadership can deliver high quality life and vibrant public spaces"[5]. The report, which investigated active travel provision in 13 European cities comparable in terms of size and geography to Scottish cities, looks at how social, political, geographical and cultural conditions have led to 'best practice' and have brought about high rates of walking and cycling. In several of the cities looked at in the report there was not the initial public demand for active travel investment but strong political leadership led to public investment and, once the initiatives were in place the public appreciated the benefits and were supporting of further investment.

This report made a series of recommendations covering the following areas: leadership; focus on the individual's experience; local, lasting funding, and best practice.

Key recommendations (taken directly from the executive summary of the report)

Leadership

- Local politicians need to provide strong, visionary leadership to develop, implement, and carry through a robust, comprehensive, and long-term strategy for active travel.

Focus on the individual's experience

- To be successful, active travel strategies and long-term development plans must focus on improving the daily experience of pedestrians and cyclists of all ages and abilities.
- Strategies should be based around enhancing the quality of life for the general population.
- Meaningful improvements must be made to the conditions for walking and cycling, with active travel consistently promoted over several years. This will lead to cycling and walking becoming normal and popular forms of transport in two to three years.

Integrate active travel

- Ideally, a strategy for active travel should be part of an integrated sustainable travel strategy. This would consider active travel in its wider context, including issues such as spatial planning and all forms of personal and commercial transport.
- Conversely, long-term redevelopment and regeneration plans must be developed with pedestrian and cycle-friendly environments recognised as the core around which economic growth, public health, sustainability and overall quality of life are built.
- Active and sustainable travel should therefore be prioritised over individual motorised transport schemes and recognised for the wide range of Scottish policy objectives that they meet.

[5] J. Warren 2010 "Civilising the Streets: How strong leadership can deliver high quality life and vibrant public spaces"

Local, lasting funded,

- Detailed strategies for active or sustainable travel must be developed at the local level.
- Funding programmes from central government play a key role in encouraging the development and securing the implementation of active travel strategies.
- Strategies for active travel must always span several years, with specific, meaningful actions and goals.
- It is clear from the cities in this study that to increase active travel rates, appropriate funding is required over multiple years to improve infrastructure.

Best practice inspiration

- Stockholm can be seen as an example of how quickly appropriate action can change attitudes to, and increase use of, active travel in a city that started from a similar situation to those in Scotland.

Local authorities should consider using the EU BYPAD bicycle policy audit as part of their active travel strategy development and consider similar auditing tools for walking.

Evaluation of Sustrans' sustainable transport infrastructure work surrounding schools: Scotland[6]

In March 2011 the Centre for Local and Economic Studies were commissioned by Sustrans to assess the impact of two programmes that developed sustainable transport infrastructure round school: Tackling the School Run and Short Links. The evaluation primarily focused on understanding the qualitative aspect of these programmes for children, families and the local community, and adopted a case study approach in three areas: Moray, Dunbar and Falkirk. The evaluation has reported direct and indirect outcomes related to sustainable transport.

Direct outcomes reported are: an increase in children and parents walking and cycling to school regularly; children and parents cycling more outside of the school commute; positive attitudes towards sustainable transport; and improvements in road safety.

Indirect outcomes reported are: improvements in health and well-being; positive impact on school attendance; reduction in the perception of anti-social behaviour; increased sense of community; and environmental improvements.

Additional publications

Presentations that can be directly attributed to this work programme include:

- Scottish Transport Applications and Research Conference, Glasgow, May 2011; Value for money of walking and cycling interventions: Making the case for investment in active travel; Angela Wilson and Andy Cope, Sustrans[7]
- European Transport Conference, Glasgow, October 2010; Cycling demonstration towns – an economic evaluation; A Cope, A Kennedy, Sustrans, UK; M Ledbury, R Cambery Department for Transport, UK; J Parkin, London South Bank University, UK; N Cavill, Cavill Associates, UK[8]
- ScotStat Transport and Travel Statistical Advisory Committee, Edinburgh, April 2010; Sustrans Hands Up Scotland Survey and Key Performance Indicators; Angela Wilson and Andy Cope, Sustrans[9]

Papers which draw on elements of data collection conducted through this work programme include:

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6 Centre for Local Economic Studies 'Evaluation of Sustrans' Sustainable Transport Infrastructure Work Surrounding Schools: Scotland (2011, forthcoming)

7 http://www.transportscotland.gov.uk/files/documents/projects/STAR_2011.pdf

8 http://www.etcproceedings.org/paper/cycling-demonstration-towns-an-economic-evaluation

9 http://www.scotland.gov.uk/Topics/Statistics/Browse/Transport-Travel/scotstat/Paper3-2010

- Children's travel to school – are we moving in the right direction? - Glasgow Centre for Population and Health[10]
- Walking and cycling and socio-economic status in Scotland: analysis of statistical data and rapid review of the literature[11]

A number of further publications are thought to be in preparation drawing on Sustrans' data in Scotland as source material

Future evaluation

Sustrans is a strategic partner of the Engineering and Physical Sciences Research Council. A number of significant academic research projects have emerged from this relationship. Two of these links directly to Sustrans' work in Scotland:

The iConnect (Impact of COnstructing Non-motorised Networks and Evaluating Changes in Travel) study aims to measure and evaluate the changes in travel, physical activity and carbon emissions related to Sustrans' Connect2 programme, which is an ambitious UK-wide project that will transform local travel in 79 communities by creating new crossings and bridges to overcome barriers such as busy roads, rivers and railways, giving people easier and healthier access to their schools, shops, parks and countryside.

The five-year iConnect study started in May 2008 and involves a broad evaluation of the whole programme coupled with detailed investigations at five specific sites. We hope to determine if the new routes have got more people switching from using their cars to walking or cycling, helping them to get more physically active and reducing their carbon footprint.

One of the five case studies that they are looking at is in Glasgow, the Bridge to Nowhere Connect2 scheme. Research design and data collection are ongoing.

Visions 2030 is commenced in October 2008 and involves the universities of Leeds, Oxford, East Anglia, Salford and Manchester, in consultation with local walking and cycling groups in four UK cities. It builds upon a growing recognition that walking and cycling can make a considerable contribution to sustainable transport goals, public health and the sociability of communities.

This research assesses the potential in the UK for achieving substantial increases in walking and cycling by 2030. Evidence based pathways will be developed with input from a new range of participatory tools to determine the suitability of alternative packages of measures. Through innovative approaches to analysis, more challenging longer term targets can be reached and the step changes necessary to fully maximise the potential of walk and cycling in achieving a sustainable transport system and a more inclusive society can be realised.

Part of their strategy for dissemination and application involves conducting 'trajectory modelling' in a number of settings. Such an exercise is due to be undertaken in Kirkcaldy, with Fife Council and other relevant stakeholders, during autumn 2011.

[10] http://www.gcph.co.uk/assets/0000/1126/GCPH_Briefing_Paper29_web_final.pdf
[11] http://www.healthscotland.com/uploads/documents/13734-REO15-WalkingAndCyclingInScotland.pdf

2.13 Hands Up Scotland Survey in primary schools

Key performance indicator 13: hands Up Scotland Survey in every primary school – data compiled

Of the 32 local authorities in Scotland, all 32 participated in 2010, when 82% of primary schools returned data for the Hands-Up Scotland survey, compared to 78% in 2008 and 84% in 2009. Sustrans is working with the Scottish Government to enable the dataset to gain National Statistic status.

Summary

- 2,051 primary schools in 32 local authority areas, received the survey, of which 1,676 (82%) returned data
- this amounts to 276,193 primary school pupils in 2010, compared to 268,242 primary school pupils in 2009 and 260,505 primary school pupils in 2008, a year-on-year increase of just under 3%
- in 2010, 53.5% of primary school children travelled in an active way (walking, cycling, scooter/skate), compared with 53.3% in 2009 and 56% in 2008
- in 2010, 48.7% of primary school children usually travelled to school on foot, compared with 49.5% in 2009 and 51.6% in 2008
- 3.7% of primary school pupils cycled in 2010 compared with 3.0% in 2009 and 3.4% in 2008.

Approach

The first ever national Hands Up Scotland Survey took place across Scotland in 2008. The survey was repeated in September 2009 and September 2010 using the same methodology, with results published in May 2010 and May 2011 respectively.

All 32 local authorities submitted data to Sustrans in 2010. This amounts to 276,193 primary school pupils in this cohort. In 2009, 31 of the 32 local authorities submitted data to Sustrans. This amounted to 268,242 primary school pupils in 2009, and compared to 260,505 primary school pupils in 2008, a year-on-year increase of approximately 3%.

In terms of response rates, 2,051 primary schools received the survey for completion in 2010. 82% of these primary schools completed the survey, with 61% of all returning the data split by class. Table 2-14 summarises response rates overall.

Table 2-14: Response rates for National Hands Up Scotland Survey 2010

School Type	Year	No. of schools which received survey	No. of schools which returned data	% of schools which returned data	No. of schools with data split by class	% of schools with data split by class
Nursery	2009	306	238	77.8%	Not applicable	
	2010	**601**	**387**	**64.4%**		
Primary	2008	2,029	1,587	78.2%	1,352	66.6%
	2009	1,980	1,658	83.7%	1,199	60.6%
	2010	**2,051**	**1,676**	**81.7%**	**1,247**	**60.8%**
Secondary	2008	334	219	65.6%	154	46.1%
	2009	317	251	79.2%	198	62.5%
	2010	**338**	**264**	**78.1%**	**221**	**65.4%**
Independent	2008	37	13	35.1%	8	21.6%
	2009	21	11	52.4%	6	28.6%
	2010	**24**	**10**	**41.7%**	**7**	**29.2%**
SEN	2008	7	5	71.4%	2	28.6%
	2009	43	19	44.2%	4	9.3%
	2010	**66**	**37**	**56.1%**	**17**	**25.8%**
All Schools	2008	2,407	1,824	75.8%	1,516	63.0%
	2009	2,361	1,939	82.1%	1,407	59.6%
	2010	**2,479**	**1,987**	**80.2%**	**1,492**	**60.2%**

Results show that in 2010, 49.3% of children in the survey travelled to school in an active way (walking, cycling, scooter/skate), compared with 49.9% in 2009 and 51.8% in 2008. In 2008, 48.3% of children surveyed usually travelling to school on foot, compared with 47.0% in 2009 and 45.8% in 2010. Concerning cycling, 2.8% of pupils cycled in 2010, compared with 2.3% in 2009 and 2.8% in 2008. Table 2-15 summaries the results of the survey by school type.

Table 2-15: Hands Up Scotland Survey: Travel modes by school type

School Type	Year	Walk	Cycle	Scooter/ Skate	Park & Stride	Driven	Bus	Taxi	Other	Total
Primary	2008	51.6%	3.4%	1.0%	7.4%	26.1%	8.7%	1.6%	0.2%	260,505
	2009	49.5%	3.0%	0.8%	8.4%	27.9%	8.5%	1.7%	0.2%	268,242
	2010	**48.7%**	**3.7%**	**1.0%**	**9.4%**	**27.3%**	**8.0%**	**1.6%**	**0.2%**	**276,193**
Secondary	2008	42.8%	1.6%	0.2%	3.6%	12.7%	37.2%	1.0%	0.9%	129,161
	2009	42.8%	1.2%	0.2%	3.5%	14.3%	35.9%	1.2%	0.9%	144,436
	2010	**41.9%**	**1.2%**	**0.2%**	**4.1%**	**14.8%**	**36.0%**	**1.1%**	**0.7%**	**157,483**
Independent	2008	27.2%	1.9%	0.6%	7.1%	42.4%	18.3%	0.4%	2.0%	6,578
	2009	22.6%	1.6%	1.0%	6.3%	53.1%	14.3%	0.2%	0.9%	2,686
	2010	**19.4%**	**1.7%**	**0.2%**	**5.0%**	**43.5%**	**23.1%**	**0.2%**	**7.0%**	**3,631**
SEN	2008	13.5%	*	0.0%	4.5%	6.8%	47.4%	26.3%	*	133
	2009	4.3%	*	0.0%	*	7.3%	54.1%	33.9%	0.0%	440
	2010	**4.5%**	**0.4%**	**0.0%**	**2.9%**	**24.7%**	**20.9%**	**25.3%**	**21.3%**	**2,094**

Future activity

The survey was originally set up in 2008 to standardise existing data collection taking place across Local Authorities in Scotland. The survey ran in September 2008 and was repeated in September 2009 and September 2010. Results were released in May 2009, May 2010 and May 2011.

In terms of trends, it must be noted that the three iterations of the Hands Up Scotland Survey are not sufficient to illustrate any meaningful trends in travel behaviour. If one just observes what the trend is at the national level, no rapid changes are to be expected, and generally a trend indicating the direction of change over the longer term will only become apparent once the methodology is settled and the actual state of things is sufficiently determined. In a time series small dips are often observed in an overall increasing trend.This points to the need for more years of data to be collected over time before the true underlying trend will become apparent.

Part of the strategy for dissemination and application involves conducting 'trajectory modelling' in a number of settings. Such an exercise is due to be undertaken in Kirkcaldy, with Fife Council and other relevant stakeholders, during autumn 2011.

Following meetings between Sustrans Scotland, the Sustrans' Research and Monitoring Unit, the Scottish Government and the Office of the Chief Statistician steps are now being taken to enable the dataset to gain National Statistic status. It is anticipated that the Hands up Scotland Survey will be placed on the Scottish Official Statistics Order in 2012. There was also a brief outline on the policy of wishing to share data when needed with researchers and academics.

2.14 Gathering data from all local authorities

Key performance indicator 14: attempt to gather data for traffic-free paths from all 32 local authorities

Sustrans currently receives data from 27 local authorities, including 17 authorities who supply automatic cycle counter data. Similar data is expected from three more and all others have been contacted to request data.

Summary

- good progress is being made towards this key performance indicator. Data is collected from 27 out of 32 local authorities in Scotland
- all 32 local authorities returned data for the National Hands Up Scotland Survey in 2010, building on the responses from 29 local authorities in 2008 and the 31 received in 2009.

Progress

Sustrans holds a database of automatic cycle counters located across the UK. In Scotland, data coverage is across 20 of the local authorities. Table 2-16 summarises where Sustrans receives data or where partnerships to receive data have been set up.

Hands Up Scotland Surveys were also returned from all of the local authorities in 2010.

Table 2-16: Partnerships and data received for local authorities across Scotland

Local Authority	Count data collected by local authority	Count data collected by partner	Currently expecting count data	Route user intercept survey data collected	Hands Up Scotland Surveys returned
Aberdeen City				✓	✓
Aberdeenshire					✓
Angus	✓			✓	✓
Argyll and Bute		✓		✓	✓
Clackmannanshire	✓			✓	✓
Dumfries and Galloway	✓			✓	✓
Dundee City				✓	✓
East Ayrshire				✓	✓
East Dunbartonshire				✓	✓
East Lothian				✓	✓
East Renfrewshire				✓	✓
Edinburgh City	✓			✓	✓

Local Authority	Count data collected by local authority	Count data collected by partner	Currently expecting count data	Route user intercept survey data collected	Hands Up Scotland Surveys returned
Falkirk				✓	✓
Fife	✓			✓	✓
Glasgow City			✓	✓	✓
Highland		✓		✓	✓
Inverclyde	✓			✓	✓
Midlothian	✓			✓	✓
Moray	✓			✓	✓
North Ayrshire		✓			✓
North Lanarkshire	✓			✓	✓
Orkney Islands					✓
Perth and Kinross			✓	✓	✓
Renfrewshire		✓		✓	✓
Scottish Borders					✓
Shetland Islands					✓
South Ayrshire	✓			✓	✓
South Lanarkshire			✓		✓
Stirling		✓		✓	✓
West Dunbartonshire	✓			✓	✓
Western Isles					✓
West Lothian	✓			✓	✓

2.15 Development of a method for measuring the impact on access to jobs and services in project areas

Key performance indicator 15: develop a method for measuring the impact on access to jobs and services in project areas

Summary

Point-of-origin postcode data plots give a broad indication of the catchment of users and changes in the ranges of destinations being accessed; two case studies show a more diverse trip type base following intervention.

Monitoring information of relevance to assessing changes in accessibility following intervention delivery

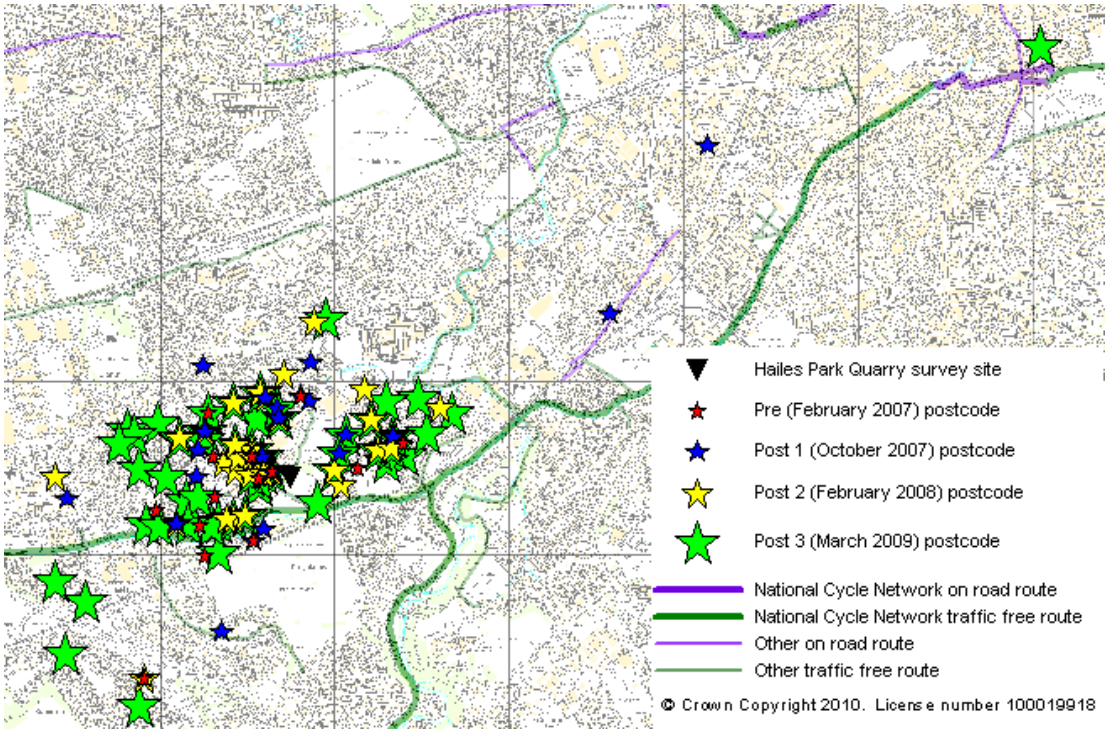
When asked if they could have used another mode of transport to make their journey or whether they might not have made the trip at all, 34.1% of users surveyed using the National Cycle Network in Scotland stated that they would not have made the journey that they were recorded making on the day of the survey. Although route user intercept surveys do not ask directly about users perceptions of changes in the ease with which they can access goods and services, data are gathered concerning the purpose of the trip being made. Changes in the proportions of trips being made for specified purposes between pre and post intervention surveys suggest that, following improvements, routes are being used to access a more diverse range of destinations than previously. Postcode data are collected as part of the survey. By plotting the distribution of postcodes, it is possible to get a very broad indication of the catchment of the route, the hypothesis being that an intervention improving accessibility may draw users from areas previously with poorer accessibility to locations and facilities served by the intervention.

Case study: Hailes Quarry Park, Edinburgh

Route development at Hailes Quarry Park included improvements to accessibility, new path construction and improvements to the wider network. In the pre intervention survey, only leisure (93.8%) and shopping (6.2%) trips were recorded. Surveying users after the improvements in 2009 found the route to be used for a more diverse range of journeys – the majority of trips (61.4%) were still for leisure, but commuting (11.9%), education (9.4%) and personal business (2.8%) trips were also recorded, whilst the proportion of trips for shopping increased to 14.5%.

Origin postcodes of users collected during each of four surveys performed at this site are presented in Figure 2-2. Later surveys suggest a wider spread of route users, although this must be placed in the context of the survey data. The percentage of postcodes that were successfully mapped was 22% in the pre survey, 59% in the first post survey, 76% in the second post survey and 92% in the final post survey. Whilst users do appear to be originating over a greater area in the final survey compared to earlier iterations, this may be the result of fewer postcodes being successfully plotted for the earlier surveys; it may be that users were originating from the same area as in later surveys, but that postcode data were incomplete or otherwise could not be mapped.

Figure 2-2: Distribution of origin postcodes of route users recorded at the Hailes Quarry Park survey site

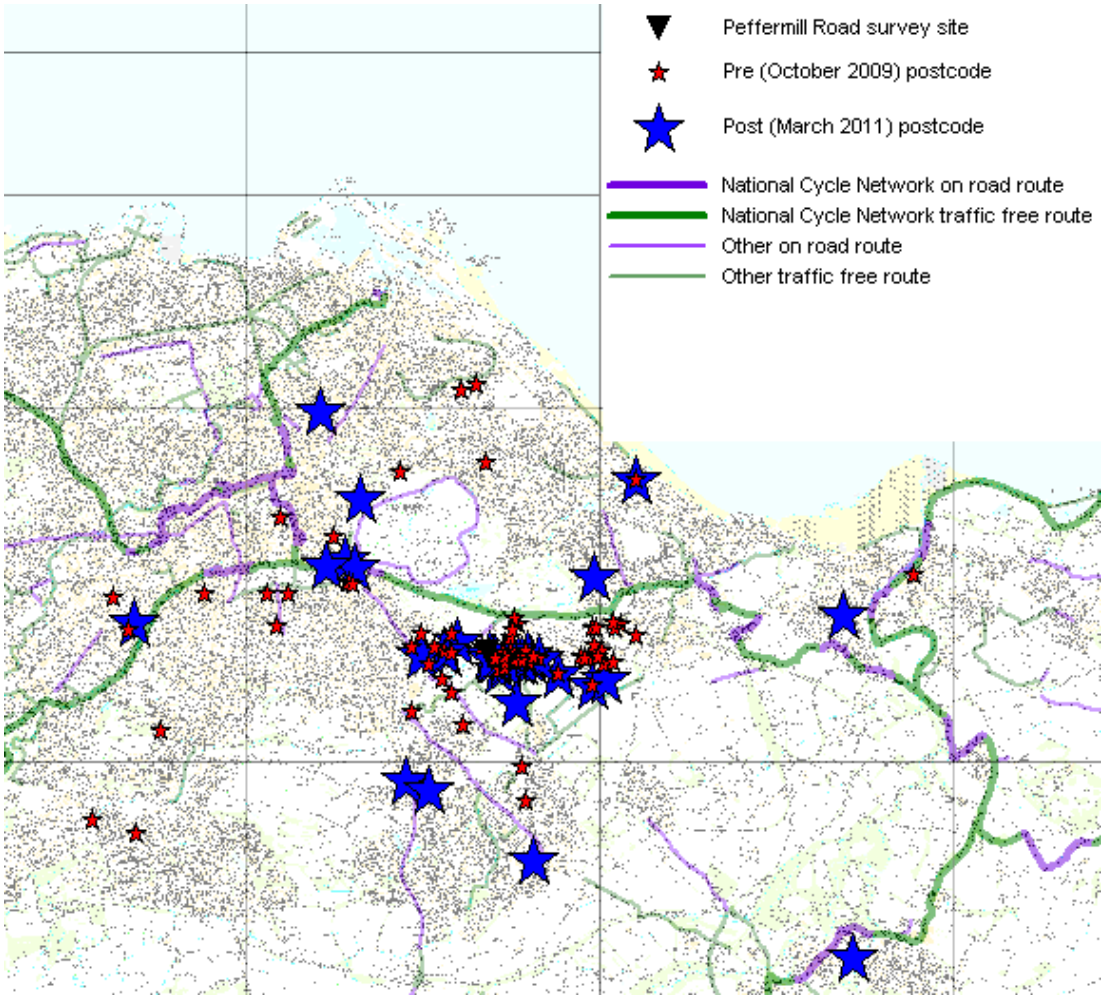


Case study: Peffermill Road, Edinburgh

Pre intervention surveys performed at Peffermill, Edinburgh in 2009 found 30.5% of trips to be made for leisure, 10.4% for personal business, 25.7% for shopping, 8.6% for education, 21.8% for commuting, 0.9% for other escort and 2.1% other purposes. The post survey performed in 2011 following the completion of the Tackling the School Run scheme in the area found 33.1% of trips to be for leisure, 6.7% for personal business, 16.6% for shopping, 8.6% for education, and a notable increase in commuting trips, representing 34.9%.

The distribution of origin postcodes around the survey site are presented in Figure 2-3. The percentage of postcodes successfully mapped was 82% for the pre survey and 75% for the post survey. Whilst less marked than for the Hailes Quarry Park example, there appears to be some spread in journey origin between the pre and post surveys.

Figure 2-3: Distribution of origin postcodes of route users recorded at the Peffermill Road survey site



Refining approaches to measuring accessibility

Accessibility, the "ability of people and businesses to access goods, services, people and opportunities" is considered within the Scottish Transport Appraisal Guidance (STAG)[12] in the accessibility and social inclusion objective.

Community accessibility (encompassing public transport coverage and local accessibility – the extent to which local services and facilities can be accessed by cyclists and pedestrians) and comparative accessibility (considering the distribution of impacts on accessibility by social group and by location) are included within the appraisal process.

Whilst in this case impacts on accessibility in the context of performing a complete appraisal are not considered, it is useful to draw on the methodologies recommended within the STAG guidance. Part One appraisal of impacts on accessibility is based on qualitative information, whilst Part Two appraisal draws on both qualitative and quantitative data. In Part One appraisal, changes in accessibility for cyclists and pedestrians to local services should be described. Changes in accessibility by the population to local services should be measured in Part Two appraisal.

[12] Transport Scotland (2008) STAG Technical Database Section 11. Accessibility and Social Inclusion (http://www.transportscotland.gov.uk/files/STAG_Technical_Database_Section_11_May_2008.pdf)

Changes in accessibility by walking and cycling are assessed on the basis of:

- Origin accessibility – the opportunity for individuals of small groups of households to access local facilities
- Destination accessibility – the walking or cycling catchment for local services and facilities

The guidance recommends the use of mapping techniques in order to make a quantitative assessment of these factors, based on the journey time.

Thresholds for acceptable walking distances to facilities as presented in the STAG guidance are listed in Table 2-17. Acceptable cycling distances are noted to be typically two to three times those for walking.

Table 2-17: Acceptable walking distance to facilities (STAG Technical Database Section 11)

Facility	Acceptable walking time and distance
Walking to facilities	20 minutes (1.4-1.6 km walk)
Walking to bus stop (urban)	5 minutes (300 to 500 metre walk)
Walking to bus stop (rural)	10 minutes (600 to 1,000 metre walk)
Walking to railway station	10 minutes (600 to 1,000 metre walk)

For a more detailed understanding of accessibility impacts, detailed qualitative studies involving the local population are recommended.

With sufficient supporting monitoring information, it should therefore be possible to estimate changes in cycling and walking time following the delivery of walking and cycling interventions, particularly new route construction or improvements to existing routes.

Halden et al (2000)[13] review techniques for measuring accessibility. One of the case studies included was access to the Garthdee campus of Robert Gordon University in Aberdeen. No specific transport data were available for this case study, instead, the authors used a zoning approach together with freely available demographic information and estimates of travel time to assess access to the University campus by walking and cycling. Ward boundaries were taken to define zones across the city. Using typical travel speeds and road distances, travel times between zone centroids were estimated. The percentage of the whole and subgroups of the population able to access the University campus within a threshold travel time of 30 minutes were estimated.

Such an approach could be used to explore changes in access to jobs and services in the context of the work of Sustrans Scotland, subject to the following limitations:

- The method would be suitable for exploring changes in accessibility following delivery of infrastructure schemes either adding substantially to the walking and cycling network, or overcoming a specific physical barrier to journeys by these modes.
- The definition of a study area will be necessary; this should include a local centre, access to which could be taken as a proxy for access to jobs and services. The study area should be wide enough to encompass several zones for which travel times could be calculated. It may be useful in the first instance to consider areas where either wide scale interventions are being delivered – for example, Kirkcaldy or Edinburgh – or where infrastructure targeting an accessibility issue has been delivered, serving the wider community – for example, Connect 2 interventions.

[13] Halden D, McGuigan D, Nisbet A and McKinnon A (2000) Accessibility: Review of Measuring Techniques and their Application. Derek Halden Consultancy.

- Whilst it should be straightforward to estimate trip distance by road for different zones within the study area using maps or GIS programmes, depending on the degree of cycling infrastructure in place, there will be a number of ways to access the central destination from different zones by bike. In order to standardise these in some way, we suggest calculations of the percentage population able to access the local centre using various combinations of roads without cycling provision, on-road cycling facilities and traffic free cycling routes.

The approach outlined above would provide an overview of changes in the accessibility (based on a threshold travel time) to jobs and local services contained within a local centre by cycle using different types of infrastructure. However, this approach does not allow either for the propensity to cycle using different types of infrastructure, nor the fact that threshold travel times may be different depending on the options available to users. For example, a slower journey made on a pleasant, traffic free route may be preferable to user s than a shorter, faster journey on a busy road. There may be scope to apply a longer threshold time for journeys using specific types cycle routes (traffic free, on road, etc); further research will be necessary to support this.

3 Additional relevant information

3.1 Introduction

Included in this section are data that comes from the wider monitoring and evaluation programme in Scotland, but which does not directly relate to the key performance indicator set. As the delivery programme has evolved, a number of projects have emerged that are not necessarily reflected in the indicators. Some parts of this programme are funded by the Scottish Government grant (for example; I Bike, Street Design), while other parts are not (e.g. Connect2). Nevertheless, these elements reflect an 'added value' that Sustrans has brought to the delivery programme, and they could potentially help to indicate the future shape of the monitoring and evaluation programme. In each case, the material reported presents additional information relating to the effectiveness of the overall package of investment. These activities include:

- the Kirkcaldy travel behaviour survey
- STAG-based analysis of scheme value for money
- development of a monitoring and evaluation framework for the Edinburgh ATAP
- a qualitative study of the impacts of community links schemes
- data collection associated with the I Bike programme
- Street Design data collection
- Connect2 data collection and highlights to date

3.2 The Kirkcaldy travel behaviour survey

Introduction

A town-wide programme of delivery has been initiated in Kirkcaldy – the Make your Move Kirkcaldy programme. The monitoring and evaluation of the project is designed to link directly to the aims, objectives and outcomes of the project. It is important that ultimately the monitoring and evaluation links directly to the project work in terms of aims, objectives and outcomes, but also inputs, activities and outputs. This will assure that all project efforts are monitored and potential impacts are assessed while no monitoring and evaluation is performed around indicators not directly or deliberately targeted through the project delivery.

Rationale for monitoring

The core data sources for the monitoring of the project will be manual and automated pedestrian and cycle counts, route user intercept surveys, and an intervention diary. This will be supplemented by a travel behaviour survey and a travel diary.

The objectives of each of the core elements are:

- estimation of levels of walking and cycling and changes in levels of walking and cycling, based on automatic and manual counts of pedestrians and bicycles
- estimation and levels of change in user activity, trip type, origin and destination, user population characteristics, and attitudinal data based on route user intercept surveys
- determination of effectiveness of interventions, based on observation of the coincidence of changes in walking and cycling activity with timing of interventions, as recorded in an intervention diary.

The objectives of the travel behaviour survey and travel diary are:

- understanding of the travel patters of the residents of Kirkcaldy
- understanding of the attitudes to walking and cycling in Kirkcaldy
- estimation of the levels of physical activity in Kirkcaldy
- understanding of perceptions of safety and of active travel.

Secondary analysis of the travel behaviour survey will be used to:

- asses any potential for modal change
- provide an economic appraisal of the project
- determine the CO_2 impact of the project interventions
- determine the impact attributable to project interventions.

Additionally, results from the monitoring may be used to inform the planning of interventions.

Methodological approaches

A range of approaches will be implemented to monitoring in Kirkcaldy. Automatic and manual counts will be used to look for changes in levels of walking and cycling in locations that have been identified as the key routes or key destinations in the town. In addition to manual and automatic counts of cycles, other monitoring techniques (for example, intercept surveys of route users, counts of parked bikes, workplace travel surveys, surveys of cycling behaviour and attitude, school travel surveys) will be used to assess the impacts of specific interventions. The travel behaviour survey and travel diary will be used to assess the wider impact on travel patterns and attitudes across the whole of Kirkcaldy.

In all cases, it is intended to establish a baseline from which either to monitor continuously or to follow up after the individual intervention or on completion of the project.

Preliminary results from the pre-survey

The data suggest that there are relatively high levels of inactivity and sedentary behaviour in Kirkcaldy. Few (12%) cycle but most people (96%) do walk in a typical week. There is some evidence to suggest that walking is becoming more prevalent, but this cannot be said for cycling. There is a largely positive opinion of walking and facilities for walking ion Kirkcaldy. Although there is a less positive view of cycling, there does not seem to be much antipathy towards cycling. 46% disagreed (against 20% agreeing) that that Fife Council should not be spending money on encouraging people to cycle.

3.3 HEAT-based analysis of the value of active travel on the NCN

Estimating physical activity benefits

The value of the health benefit associated with walking and cycling trips on the National Cycle Network has been estimated using the World Health Organisation's Health Economic Assessment Tool (HEAT) for cycling and walking. An on-line tool requires input data to generate a simple output expression. The present value of the mean annual benefit attributable to physical activity associated with active travel is estimated to be £28.4 million from walking and £31.6 million for cycling trips.

3.4 STAG-based analysis of scheme value for money

Introduction

The requirement for new project proposals to be accompanied by a robust business case presents a number of challenges in how projects can help realise economic benefits and show value for money. Economic appraisal techniques are used to demonstrate the economic value of benefits of projects in monetary terms. The Scottish Transport Appraisal Guidance (STAG) provides the framework against which investments in transport infrastructure, including cycle route, are appraised in Scotland. Within the Scottish Transport Appraisal Guidance (STAG) walking and cycling sit within the Environment criterion, where health benefits and absenteeism benefits are considered in the physical fitness subcriteria. Accidents are considered within the safety criterion.

Estimations of value of money of example short links schemes

Data collected via pre and post intervention surveys at locations where short links schemes have been delivered can be used within standard tools and calculations for estimating the economic value of the benefits accrued to users of the scheme. Estimations of the value of health and absenteeism benefits have been made based on STAG guidance for several short links schemes, examples of which are presented below in Table 3-1. In each case, two benefit to cost ratios are presented. The first is based on health, absenteeism and accident benefits only. The second is extended to include estimations of journey ambience, decongestion and carbon benefits.

Table 3-1: Estimation of benefits received from short links schemes

Scheme	Benefit	Benefit value (£, ten years)	Total cost (market price adjusted)	Ratio
Lenzie, East Dunbartonshire	Absenteeism	£9,752	£135,387	1.4:1
	Health	£183,291		
	Accidents	£442		
	Subtotal	£193,486		
	Ambience	£20,944	[as above]	**1.6:1**
	Decongestion	£4,805		
	Carbon	£225		
	Total	**£219,460**		
Mauricewood, Midlothian	Absenteeism	£21,752	£46,919	8.9:1
	Health	£396,371		
	Accidents	£851		
	Subtotal	£418,974		
	Ambience	£30,920	[as above]	**9.8:1**
	Decongestion	£9,253		
	Carbon	£434		
	Total	**£459,581**		
Dumbarton, West Dunbartonshire	Absenteeism	£62,832	£83,344	12.7:1
	Health	£994,530		
	Accidents	£1,142		
	Subtotal	£1,058,505		
	Ambience	£102,112	[as above]	**14.1:1**
	Decongestion	£12,417		
	Carbon	£582		
	Total	**£1,173,616**		

Using the benefits of walking and cycling specifically included in the STAG guidance calculated over a ten year period gives benefit to cost ratios in the range of 1.4:1 to 12.7:1 for the three example schemes summarised here. Expanding the assessment to include other benefits gives ratios in the range of 1.6:1 to 14.1:1. In each case, health benefits represent the largest proportion of the overall benefits.

These assessments suggest that, based on the information available concerning use and changes in use over time, walking and cycling scheme s offer good value for money. The estimates reported herein are anticipated to be conservative given that current methodologies do not allow the valuation of benefits to children and young people, and health benefits are limited only to morality benefits, and not morbidity.

3.5 Development of a monitoring and evaluation framework for the Edinburgh ATAP

Introduction

The City of Edinburgh Active Travel Action Plan (ATAP) seeks to increase the number of people in Edinburgh walking and cycling, both as a means of transport and for leisure. The plan will work towards this aim by:

- improving the city's walking and cycling infrastructure
- marketing of the opportunities to walk and cycle in the city
- promoting walking and cycling

The overarching aim aligns with a series of project objectives:

- deliver a range of established and new interventions that encourage and support cycling and walking (by providing practical training, support, advice and motivation)
- improve the physical environment and provide facilities for walking and cycling throughout Edinburgh, this includes specific cycle networks to benefit both families and commuters
- seek legislative and existing bylaw changes to create an urban environment that is more conducive to cycling and walking

Monitoring framework and plan

Sustrans worked with the City of Edinburgh Council to develop a monitoring and evaluation framework and a practical monitoring plan that will underpin the delivery of the plan.

The monitoring framework and plan are based on the DfT preferred logic framework which takes into the account the following outcomes:

- to increase the cycling mode share for (1) the journey to work to 10% by 2015 and 15% by 2020, and (2) all trips to 5% by 2015 and 10% by 2020
- to increase cycle numbers and cycling mode share for travel to Central Edinburgh, and to maintain pedestrian numbers and pedestrian mode share at current levels
- to increase the walking mode share for (1) the journey to work to 20.5% by 2015 and 21% by 2020, and (2) all trips to 34.5% by 2015 and 35% by 2020
- to ensure 50% of primary school children are provided with cycle training to national standard by 2013-14, and 100% by 2016
- to increase satisfaction with the cycle and pedestrian environment
- to reduce the theft of bicycles
- to increase the percentage of children walking and cycling to school
- to increase the level of health benefits attained by the public, which are derived from cycling and walking
- to demonstrate economic efficacy of investment

- to estimate reduced carbon emissions

Three monitoring programmes were developed with a range of monitoring tools:

Option one offers the full suite of monitoring methods where the value of information provided is extremely valuable – both in terms of monitoring the ATAP as well as creating a baseline that may be utilised for many future schemes and separate projects. A plan of this complexity and geographical size requires a number of different methods in order to carry out a complete evaluation of the programme delivery.

Option two provides a reduced package of quantitative and context tools, with a smaller contribution to the counter network. While the third option offers a limited amount of quantitative tools, does not include the procurement of counters and involves limited analysis as well.

3.6 A qualitative study of the impacts of community links schemes

Introduction

Sustrans commissioned CLES to undertake an evaluation of Sustrans' sustainable transport infrastructure work surrounding schools UK-wide. The evaluation was undertaken between March and May 2011. The study in Scotland aimed to asses the impact of two programmes – Tackling the School Run and Short Links, which have effectively funded the same types of activity. It was based on three case study reviews that provided a qualitative understanding of the effectiveness and impact of the programmes. These were in Moray, Dunbar and Falkirk. In each of the three areas, a single project was selected as the focus of the review.

The evaluation of the programmes is primarily focussed on understanding the qualitative impact of the programmes for children, families and the local community. This summary draws out some of the key findings. This material will be available for publication in the autumn of 2011.

Summary of outcomes relating to sustainable transport

Increase in children and parents walking and cycling to school regularly

- seeing other children and parents walking/cycling means more people choose to walk/cycle
- school commute leads to increased awareness of local routes, more confident cyclists, children putting pressure on parents to cycle, people owning roadworthy bikes

There has been an increase in the cycling and walking that children and their families do outside their school commutes:

- additional walking and cycling journeys are influenced by the school commute
- additional walking and cycling journeys are undertaken mainly for leisure purposes
- in addition to providing routes to school, Tackling the School Run and Short Links routes provide access to amenities, bridge barriers and link to town centre and other networks.

Positive attitudes toward sustainable transport

- children are more confident and proficient cyclists, meet friends and socialise on school commute, arrive at school fresh and alert, avoid traffic jams, allowed to travel alone.
- parents are more likely to walk/cycle, allow children to travel alone, drive less/car share, view school travel plan as a serious document
- schools more proactive in promoting walking/cycling, increased participation in national cycling/walking programmes

Improvements in road safety

- safe traffic free routes and reduction in cars close to school: less potential accidents
- some parent concern that safe school commute may lull children into false sense of security when cycling

Summary of outcomes relating to other benefits

Improvements in health and wellbeing

- children who cycle/walk to school seen as having more energy, a more positive mentality/attitude, being more outgoing, ill less and enjoying socialising on the school journey
- some parents saw school commute as an opportunity for them to exercise

Positive impact on school attendance

- staff say walking/cycling to school plays a part in good attendance, punctuality and positive attitude of children

Reduction in perception of antisocial behaviour

- few complaints about children travelling to and from school on local roads/streets despite initial concerns about school opening (Denny)
- local artist worked with Falkirk schools to decorate underpasses and change fear of bullying, antisocial behaviour and crime with which they were associated. Improved perception of underpasses, community saw positive contribution from young people and schools, involving young people made murals less likely to be vandalised.

Increased sense of community

- links connect communities, infrastructure works in line with resident concerns

Environmental improvements

- routes have improved general feel and look of the area

3.7 Data collection associated with the I Bike programme

Introduction

I Bike is a practical programme that delivers an intensive pro-cycling educational programme to schools in Scotland. The aim of the programme is to increase the number of pupils cycling to school, and to encourage them to do so as frequently as possible. I Bike has a particular focus on two areas:

- to counter the decline in cycling levels as pupils move from primary school to secondary school; and
- to recognise and support the differing needs of male and female pupils regarding cycling.

I Bike was established in 2009 and is currently running as a pilot in two cities – Edinburgh and Perth.

The results were positive, as demonstrated by the following top line figures from our hands-up surveys, which are completed by pupils engaged in I Bike primary and secondary schools:

Overall combined results for Edinburgh and Perth

- the percentage of pupils who cycled to school every day increased from 3.0% to 7.0%
- the percentage of boys cycling to school every day increased from 5.4% to 9.6% and the equivalent percentage for girls increased from 0.7% to 4.5%
- the percentage of pupils regularly cycling to school increased from 10.7% to 19.3%
- the percentage of pupils who reported they never cycled to school reduced from 73.3% to 59.0%
- the percentage of boys cycling outside of the school journey every day increased from 20.3% to 26.9%
- the percentage of girls cycling outside of the school journey every day increased from 6.9% to 13.3%.

The 2010 Hands Up Scotland results support the I Bike Hands Up results in that they suggest the programme had already had a positive impact upon the participating schools after only six months, with the reported levels of cycling increasing in both Edinburgh and Perth I Bike schools from 2009 to 2010 (7.0% to 8.9% in Edinburgh and 1.7% to 4.2% in Perth).

Parent survey results suggest a positive increase in the number of pupils usually cycling to primary school (from 2.8% of pupils prior to engagement in the programme to 6.4% of pupils after the first year). According to the results of the parent survey, the percentage of secondary-school age pupils regularly[14] cycling outside of school increased from 36% before I Bike to 55.9% after the first year. The percentage also increased for primary school pupils, from 59.8% to 73.8%. This may suggest that I Bike is having an impact on travel behaviours beyond the school gate.

Results from school staff surveys illustrate the positive impact I Bike made over just one year, with over half of respondents noting that cycling levels had increased at their school and 100% saying they would recommend I Bike to other schools.

The I Bike pilot continues until June 2011. Sustrans will continue to collect data for the second year of the programme and update the results at the end of the pilot.

3.8 Street Design data collection

Monitoring and evaluation frameworks have been established for two Street Design projects Elgin and Kirkcaldy. The aims of the projects are to inspire and support community-led processes to redesign streets, so that they becomes safe and attractive spaces to socialise in, play in and actively travel through. In order to assess progress towards achieving this aim the following monitoring and evaluation tools are being used:

- pre and post door-to-door household surveys to capture changes in perceptions of liveability of streets
- pre and post counts of people travelling by active modes via video recording
- pre and post video analysis of on street behaviour by residents
- pre and post traffic speed and volume counts to assess changes
- pre and post qualitative consultation with stakeholders groups including residents, local schools and partner organisations to gather their views about the impact of the project
- pre and post counts of parked vehicles to assess change in mode
- evaluation forms at events to capture numbers engaged in the project and outcomes associated with them attending the events

Through this package of monitoring tools we are aiming to assess the extent to which:

- local communities have been actively engaged in the project,
- local communities are satisfied with the process and outcomes
- place quality of the street is enhanced
- traffic speed and volume has been reduced
- the overall liveability of the streets have been improved
- broader stakeholders have bought in the process and view the projects as successful

3.9 Connect2 and iConnect

Sustrans is delivering Connect2, a national project to extend the National Cycle Network into the heart of thousands of communities across the UK. The project is transforming everyday travel for local people in communities across the UK, creating new bridges and crossings to overcome busy roads, rivers and railways, and linking these to networks of walking and cycling routes, making it easier for millions of people to walk and cycle for everyday journeys.

[14] Regular cycling' has been calculated by adding together those who reportedly cycle 'every day' and 'once or twice a week' (i.e. at least once a week)

There are three Connect2 schemes in Scotland; Glasgow, Dumfries and Hamilton. Results from the data collection methods used in these schemes, route user intercept surveys, automatic and manual cycle and pedestrian counts are considered among the KPIs of this report. Additionally, the Glasgow Connect2 scheme is one of the five case study schemes for the iConnect project. The iConnect (Impact of COnstructing Non-motorised Networks and Evaluating Changes in Travel) study aims to measure and evaluate the changes in travel, physical activity and carbon emissions related to Sustrans' Connect2 programme.

4 Conclusion

4.1 Implications of study

General headline

Evidence suggests that the programme of investment in walking and cycling that Sustrans administers on behalf of the Scottish Government is proving effective in growing walking and cycling activity. This is evidenced in the form of:

- Changes in absolute counts
- Changes in user category proportions
- Cost effectiveness
- Carbon savings
- Increases in self-reported levels of physical activity
- Tourism revenue generated

On the subject of key performance indicators

The set of core key performance indicators have proved a useful framework against which to measure performance. However, the fact that it has been necessary to change one or two of the indicators suggest that improvements could be made. In particular, the evolution of the delivery programme over the project period leads us to think that a more strategic and more dynamic solution may be desirable going forward.

4.2 Looking forward

Policy Context

We identify the key policy priority areas for this work as:

- Cycling Action Plan - 10% of all journeys will be undertaken by bike by 2020
- Scottish Climate Change Bill - 42% emissions reduction by 2020, to achieve 80% reduction by 2050
- Preventing Overweight and Obesity in Scotland: A Route Map Towards Healthy weight - reduce the rate of increase in the proportion of children with their BMI outwith a healthy range by 2018

Key performance indicators supporting delivery

Key performance indicators going forward will draw from the existing indicator set, but will also be flexible enough to respond to new projects and innovations, and to meet the requirements of ‘smartness’, as well as responding to the policy drivers listed above. In particular they will be derived using a logic mapping framework, which will ensure strategic alignment and outcome legibility. Ultimately we anticipate that the indicator set becomes strong enough to be able to used as the basis for the development of projects through a process of translation of outcomes, set in the context of policy objectives, into project planning.

APPENDICES

1 Methodological description

Table 2-1 highlights the range of methods that are required to assess progress towards the key performance indicators. This section provides more detail on the tools and methodologies used.

1.1 Monitoring tools

Automatic cycle counters

Data are collected from a network of automatic cycle counters across Scotland. Growth in the National Cycle Network and creation of connecting routes through the Tackling the School Run and Short Links projects has been accompanied by the installation of automatic counters in numerous locations. Counters are typically inductive loop based technology, recording continuous counts of cyclists on an hourly basis. These counters provide valuable data on cycle usage over time. While the monitoring period is for 2008-2011, data were accessed from an extended period (January 2006) to enable a more robust analysis of annual change from levels prior to 2008.

Route user intercept surveys

Route user intercept surveys are a common source of data for many of the indicator sets in this report. Surveys are conducted over four 12-hour periods at a particular site, providing 48-hours of coverage. Route user intercept surveys conducted as part of the Tackling the School Run and Short Links evaluations are conducted on three weekdays and one weekend day during term time. Surveys conducted on non-schools projects, typically on the National Cycle Network or other local walking and cycling networks, are conducted both during term time (one weekday and weekend day) and during the school holidays (one weekday and weekend day). During the surveys all users passing the survey site are counted, and the mode, age and gender of users are recorded. As many as possible users over the age of sixteen are intercepted to be interviewed.

Whilst the methodology for delivering route user surveys is constant, the questions asked in the survey can be changed to cover different themes and issues.

Manual cordon counts

Manual counts are conducted to provide before and after 'snapshots' of movements of different users around or across (screen lines) a given location. The manual counts can be used to look at changing patterns of usage as a result of an intervention. The counts typically take place on a weekday during term time over a twelve hour period. Data are presented in terms of changes in levels of use and in some cases of different user groups.

Hands-Up survey

Hands-Up surveys referred to in this report are those conducted as part of the annual national Hands-Up Scotland project which began in September 2008. The survey involves requesting that each school in Scotland participates in a Hands-Up survey in a given week during September. The project is a partnership between Sustrans and School Travel Co-ordinators working in local authorities across Scotland. The survey asks about usual mode of travel to school. School Travel Co-ordinators work with schools and collate the data for their authority. Sustrans' Research and Monitoring Unit collate, analyse and report on the dataset. The third iteration of the survey took place in the autumn of 2010.

Due to the comparatively short time series of data available from this survey to date, it is not yet possible to discern trends in school travel from the Hands-Up survey. Future iterations of the survey will generate longer time sequences of data from which we can begin to assess change in children's active travel journeys over time. Future work with local authorities in delivering the survey is planned to increase coverage and response rates from schools, further increasing the robustness of the data set.

1.2 Approaches to analysis

Expressing changes in levels of cycling activity recorded by automatic cycle counters

Year-on-year comparisons of continuous automatic cycle count data can indicate changes in levels of cycling over the longer term. Crude mechanisms which simply compare annual average daily totals (the standard form of output from proprietary packages handling cycle count data) disregard seasonality and weather effects, and are considered to under-represent levels of change in cycling activity. To quantify changes over time, techniques which allow for such seasonal cycles should be applied.

The preferred approach to generating an expression of change for a single continuous data sequence (i.e. for a single automatic cycle counter) is the seasonal slope estimator (Gilbert, O.R. 1987, 'Statistical Methods for Environmental Pollution Monitoring').

The slope estimator generates a value, Q_i which represents an expression of annual change in levels of cycling activity (effectively additional cycle trips per day), and is used to generate an expression representing the level of change over time.

$\underline{Q_i}$ is calculated as follows:

$$Q_i = \frac{x_{il} - x_{ik}}{l - k}$$

where x_{il} is the count (either total count or some expression of average count) in month i of year l, and x_{ik} is the count in month i of year k, where $l>k$. It is calculated for each possible pair of years in the time series (whilst observing the rule $l>k$), and the median value represents the overall change across the time series.

The Q_i values for each location are converted to an expression of percentage change for that location using a baseline value. This baseline value is the median daily count at the given site over the entire time period for which data are available. The resulting values are therefore the percentage change in the number of cycles counted per day for any given year within the time period for which data are available. Calculated in this way, the percentage change relates only to the point on the route at which the cycle counter is located over the period of time for which data are available. The value does not reflect change in levels of use of the overall route or network of routes.

An estimate of annual change across all count sites has been calculated by summing the 7-day median, summing the Q_i and expressing the summed Q_i as a percentage of the summed 7-day median.

In addition to their use in analysing overall levels of change, seasonal slope estimators were also applied to the data to determine the magnitude of changes in total counts recorded by a single counter at different times of day. The application permits some analysis to be made regarding the times of day at which any increase in counts occurs.

Investigating diurnal variation in usage growth

By analysing data collected from automatic cycle counters in terms of the distribution of counts over the course of the day, we can make inferences about the relative changes in different user typologies, e.g. commuting cyclists, leisure cyclists. Generally, hourly flows of cycles tend to show one of two patterns. In the first, there are distinct peaks during the morning (typically between 6am and 9am) and afternoon (typically between 3pm and 6pm), with a drop off in counts recorded between these times. Such sites provide a useful basis for analysis of activity, with changes in the rate of growth in cycling levels within these key periods provide the basis for investigation. The second pattern shows a gradual increase in the number of cycle counts recorded towards early afternoon, followed by a decline into the early evening.

Estimation of total National Cycle Network usage

Current mechanisms for generating total National Cycle Network usage are crude. UK-wide estimates of use are made by taking basal measures of usage per kilometre derived from route user surveys, and applying factors to reflect changes in levels of cycling activity to this basal measure on a year-on-year basis. These factors are derived from the year to year change observed in the annual average daily count recorded by automatic cycle counters.

Whilst this mechanism applies different values for trafficked and traffic-free routes, and for urban and rural areas, there is no distinction made in the base levels of activity for the different parts of the UK, particularly with respect to the devolved nations. The National Cycle Network usage estimate for Scotland reported herein was generated based on a weighting value that reflects the proportion of the National Cycle Network located in Scotland.

It is our intention to strengthen these mechanisms through the wider application of the refined approach to continuous count data analysis outlined in the previous sections. We expect to be able to configure an improved approach to base estimates of usage distribution, and to complement this with a better measure of change.

Estimating usage at a single site using survey data

Count data collected during route user intercept surveys are used to generate annual usage estimates. These are calculated by comparing the manual counts conducted over four days with observed distributions of use from continuous counts at site which are comparable.

The number of users recorded over the four 12-hour periods is considered in the context of an annual distribution of activity – either a locally sourced pattern from, for example, a continuous cycle counter located close to the survey site, or using a proxy distribution based on continuous count data from other count locations on similar route types. The expected observed count on any given day in the corresponding month is used as the basis for estimating total annual usage using relative proportions of user activity.

Weighting mechanisms are applied to refine the annual usage estimate and giving estimates by age, gender and activity. Responses by age, gender and type of activity are used to adjust the weighting to reflect changes throughout the year. For some surveys an insufficient number of responses are collected for weighting to be performed.

Estimating the extent of usage attributable to specific classes of users

Within the assembled reported material describing proportions of user categories, there is considerable reliance on the outputs from route user survey material. This material is collected as described for route user intercept surveys in the section above, but the means of presentation varies with details of aggregation and weighting.

At an individual site level, data are weighted to better represent the actual levels of usage by different categories of users. The weighting mechanism adjusts for the volume of responses relative to the counts of users recorded concurrently with the surveys, with particular reference to gender, activity (cycling or walking, or other), and day type. In some cases the proportions of particular user groups are reported based on this weighted analysis for an individual survey site. In other cases groups of surveys are aggregated and reported collectively.

Survey data from multiple sites are aggregated for one of two reasons. Firstly, for the purposes of comparing groups of pre-and-post surveys, or secondly for the purposes of describing data accumulated in any given calendar year. In the case of the former, groups of survey sites are collated irrespective of the year in which the survey was conducted, but on the basis of there being a matched pair of pre-and-post survey iterations at the same site. Usage is reported as either absolute (weighted) usage figures or by proportion. In the case of the latter, data are combined based on the

date of the survey falling within a particular year, irrespective of whether the data represent pre, post or one-off survey events. Usage is reported on a by-proportion basis.

Estimation of car trips replaced by non-motorised modes

The RUIS asks participants if they used another mode of travel to make their journey. Participants who stated they did not use a car to make any part of their journey are then asked if they could have used a car instead of cycling or walking, but actively chose not to.

The percentage of respondents stating that they could have used a car instead of walking and cycling but chose not to is then used with the adult annual usage estimate for the route to determine the total annual use of the route for trips that could have been made by car.

In Kirkcaldy the household travel diary asked respondents to record the number of trips made by each mode of transport. Each respondent was asked if, for any non-car journey, a car could have been used instead. This allowed a similar calculation to estimate how many journeys that could have been made by car have been replaced with other modes. The average number of trips per week and per day were calculated for the survey respondents and then factored up to estimate the average number of trips by all adult residents of Kirkcaldy. To estimate the yearly value, the figures were factored up to represent a year of 220 working days.

Estimation of trip length

Estimated trip lengths are used within this report in two ways i) to estimate the health benefit of walking and cycling trips both on the National Cycle Network and at specific locations using the World Health Organisation's Health Economic Assessment Tool (HEAT) for Cycling and Walking which requires an estimated trip distance as input, and ii) in estimates of potential carbon dioxide savings.

Respondents to route user intercept surveys are asked about how long their walking or cycling journey will be (expressed either as time or distance). Journey times are converted to distance using typical cycling and walking speeds. Average trip lengths for walking and cycling journeys are used directly in HEAT.

For calculations of estimated carbon dioxide savings for individual survey sites, median trip lengths are used together with the adult annual usage estimate and percentage of users who could have used a car instead of walking or cycling but chose not to from the same survey.

An estimated potential carbon dioxide saving is also presented for Sustrans work with Fife Council and the Scottish Government to improve walking and cycling routes in Kirkcaldy. The number of trips and trip distance was recorded in travel diaries completed by individuals. To ensure only trips that have the most potential to shift from car to active travel are included, the calculations of trip distance were based on the number of trips reported to be less than two miles. The average trip distance was calculated for the survey respondents and then factored up to estimate the total distance travelled by car by all adult residents of Kirkcaldy for journeys of less than two miles.

1.3 Analytical tools

STAG

In Scotland, economic appraisal of transport projects is performed in accordance with Scottish Transport Appraisal Guidance (STAG). This takes the form of a detailed guidance document and a technical database, updated quarterly. Transport schemes are assessed against several criteria, each of which has a number of associated subcriteria. Walking and cycling are considered in the physical fitness subcriterion of the environment criterion, and within the safety criterion. We have used STAG guidance in estimates of the value for money of several Tackling the School Run and Short Links projects.

HEAT

The World Health Organisation's Health Economic Assessment Tool (HEAT) is used to estimate the economic value of the health benefits associated with cycling and walking. HEAT requires the input of data on levels of walking and cycling. This is then valued in terms of the reduced mortality resulting from specified levels of activity. HEAT can be used to value existing levels of walking and cycling or to estimate the value of increased activity following the delivery of interventions encouraging walking and cycling.

Calculation of estimated carbon dioxide savings

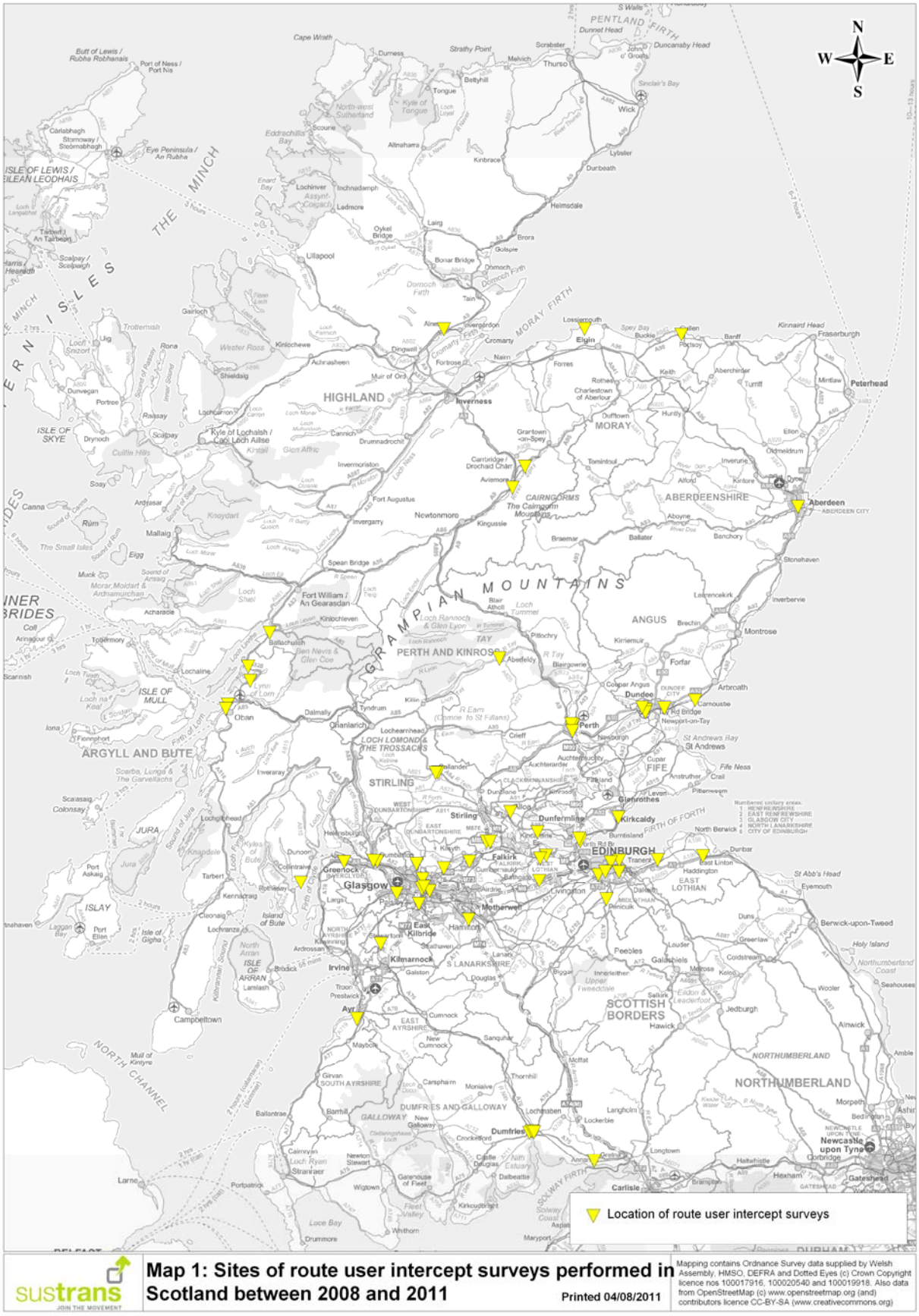
Estimates of carbon dioxide savings have been made using the recently released Department for Transport's Basic Carbon Tool for Local Authorities. The changes in the number of car trips per year and the corresponding trip lengths are inputted into the tool which uses a number of preset parameters to calculate annual reductions in CO_2 emissions. This method replaces that used in previous iterations of this report, where carbon dioxide savings have been calculated based on estimates of car kilometres replaced by walking and cycling trips, derived from route user intercept survey data.

Economic impact of cycle tourism

Sustrans has developed an economic impact model for touring and leisure cycling. The purpose of the model is to enable us to estimate the impact of cycle tourists on National Cycle Network routes or other routes of interest where sufficient supporting information is available. This not only allows us to retrospectively estimate the impact of tourists who have used routes, but also to give prospective estimations of how much income a route could potentially generate.

The model uses information on the number of tourist groups using a cycle route and the characteristics of these groups to estimate the economic impact. The inputs required by the model are: average trip duration; average group size; percentage of tourist users; percentage of leisure users; total annual usage. This information can come from route user intercept surveys or other similar sources of information that may be collected by other organisations. The output from the model is an estimate of total spending by home-based recreational users, total spending by tourist users, an overall average spend per head, and spending in different sectors (accommodation, food and drink, etc.).

2 Maps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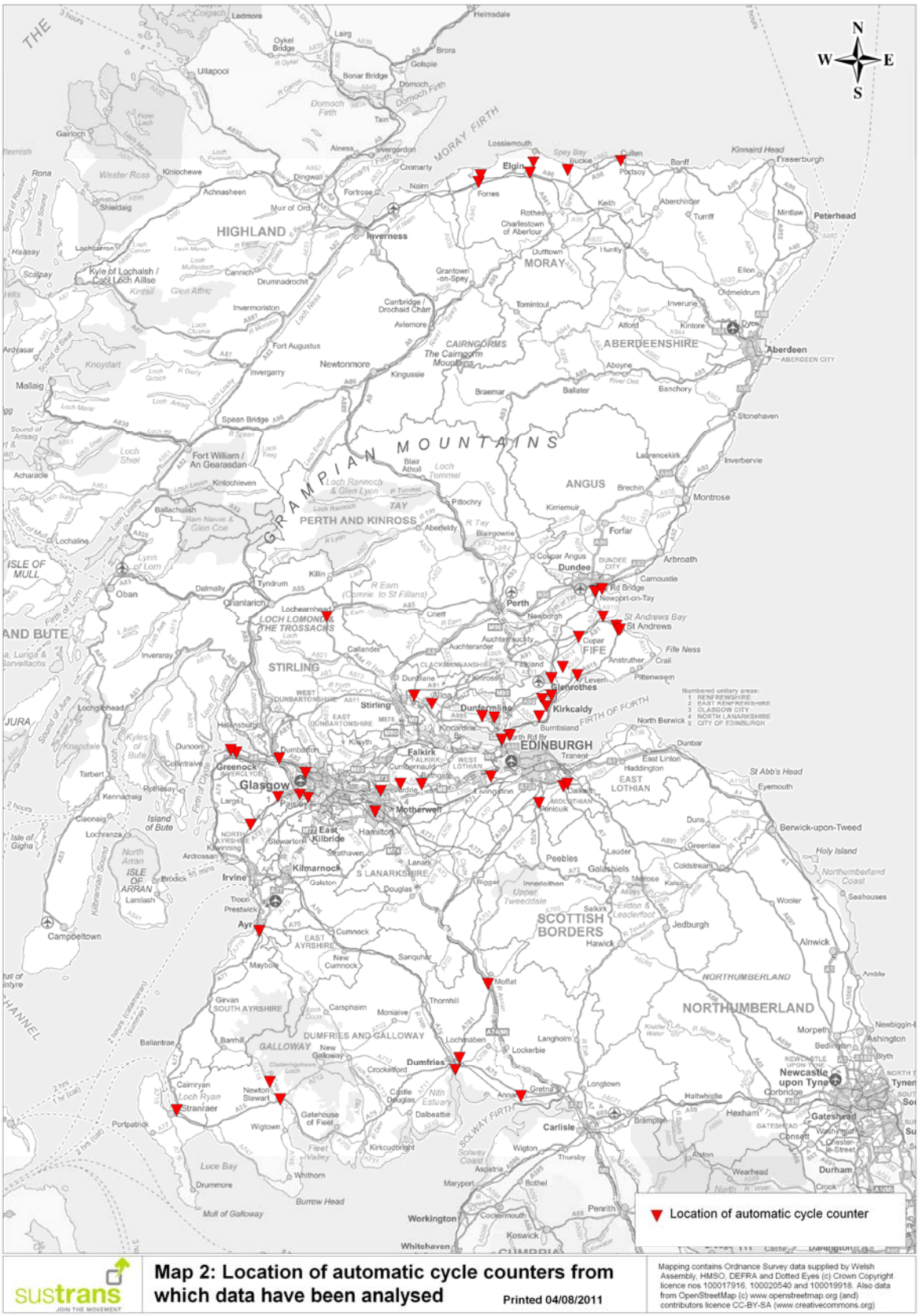
Location of route user intercept surveys
sustrans
JOIN THE MOVEMENT
Map 1: Sites of route user intercept surveys performed in Scotland between 2008 and 2011
Printed 04/08/2011
Mapping contains Ordnance Survey data supplied by Welsh Assembly, HMSO, DEFRA and Dotted Eyes (c) Crown Copyright licence nos 100017916, 100020540 and 100019918. Also data from OpenStreetMap (c) www.openstreetmap.org (and) contributors licence CC-BY-SA (www.creativecommons.org)


N
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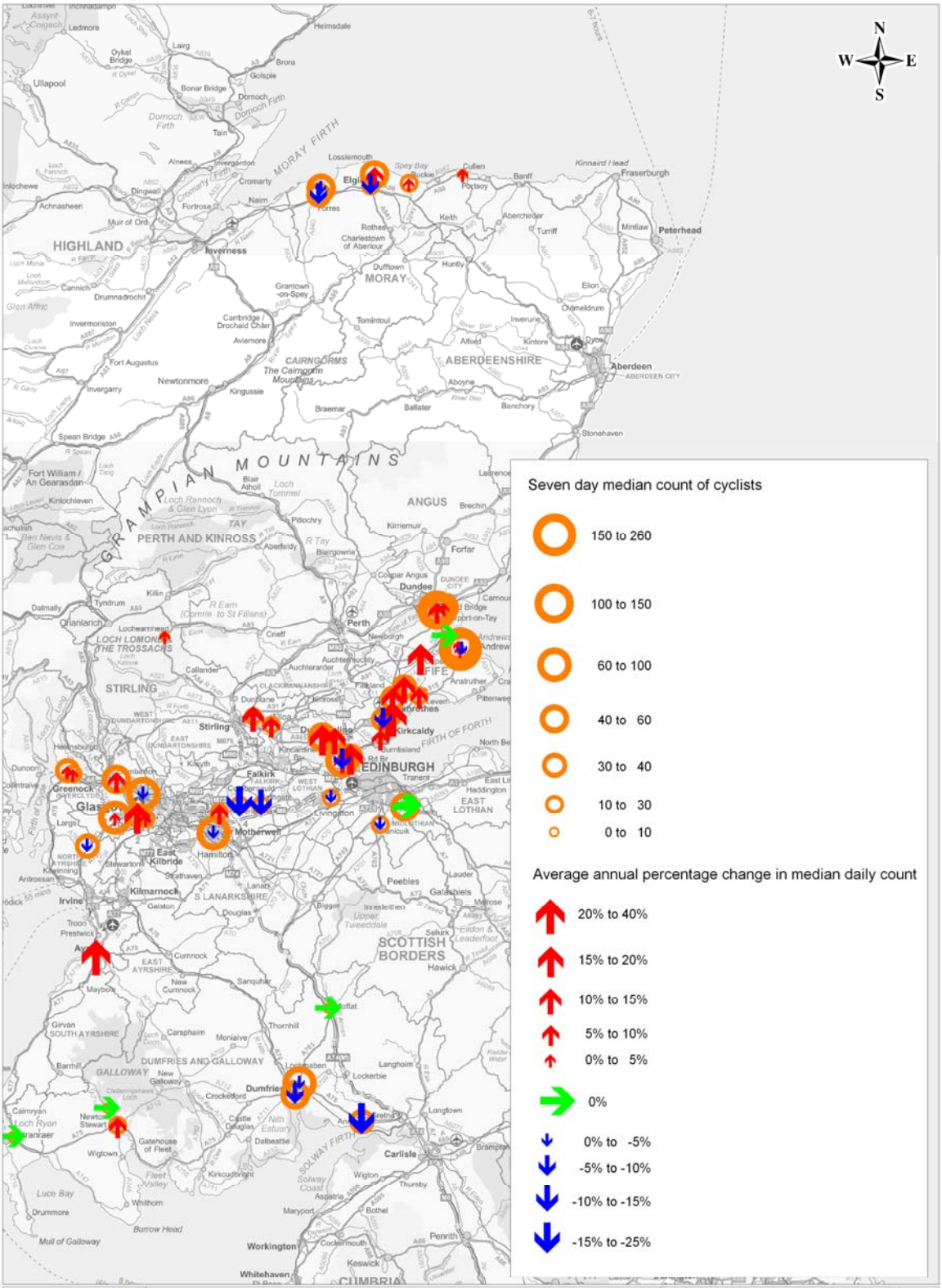
Location of automatic cycle counter
Map 2: Location of automatic cycle counters from which data have been analysed
Printed 04/08/2011
sustrans
JOIN THE MOVEMENT
Mapping contains Ordnance Survey data supplied by Welsh Assembly, HMSO, DEFRA and Dotted Eyes (c) Crown Copyright licence nos 100017916, 100020540 and 100019918. Also data from OpenStreetMap (c) www.openstreetmap.org (and) contributors licence CC-BY-SA (www.creativecommons.org)



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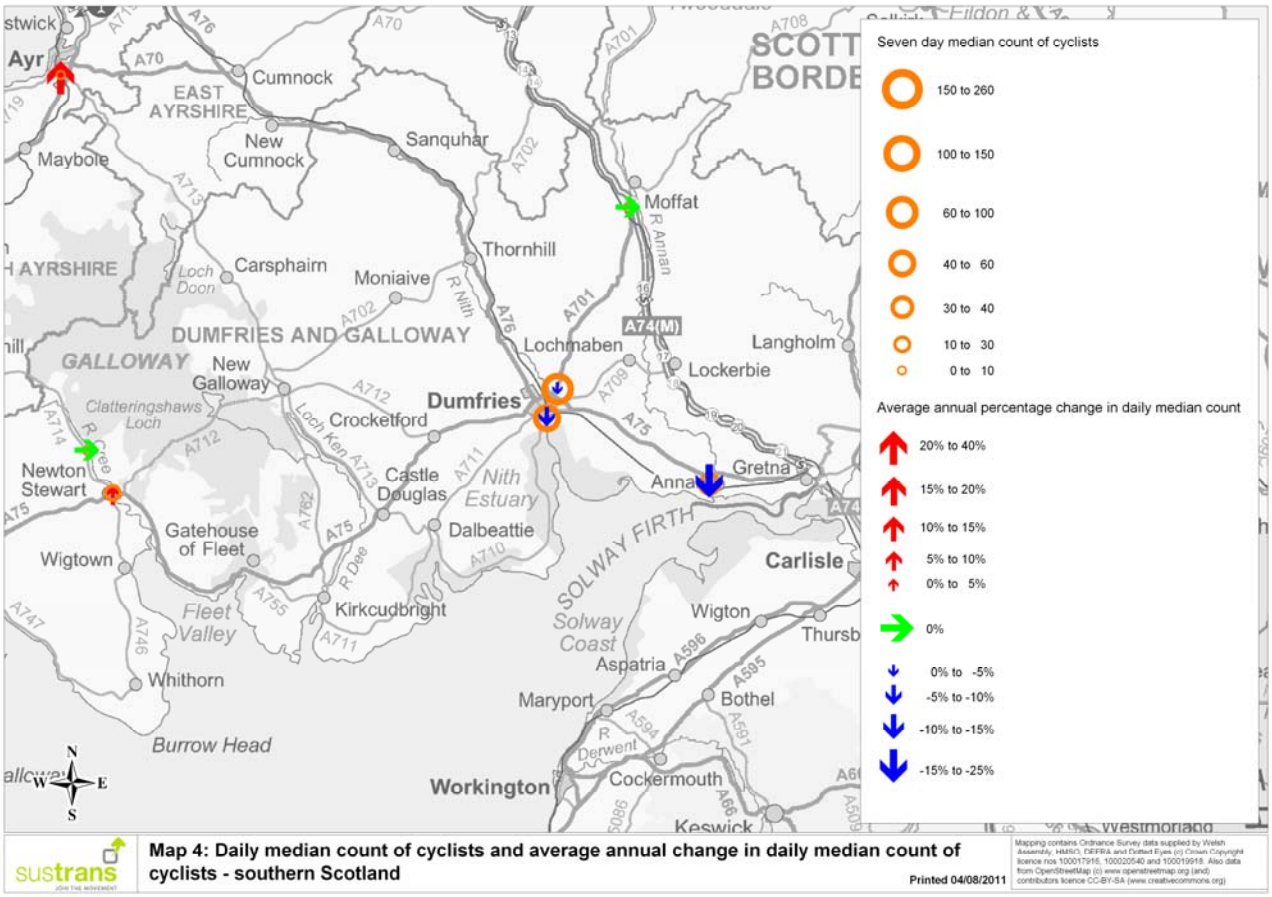
Map 3: Daily median counts of cyclists and average annual change in daliy median counts of cyclists

Printed 04/08/2011



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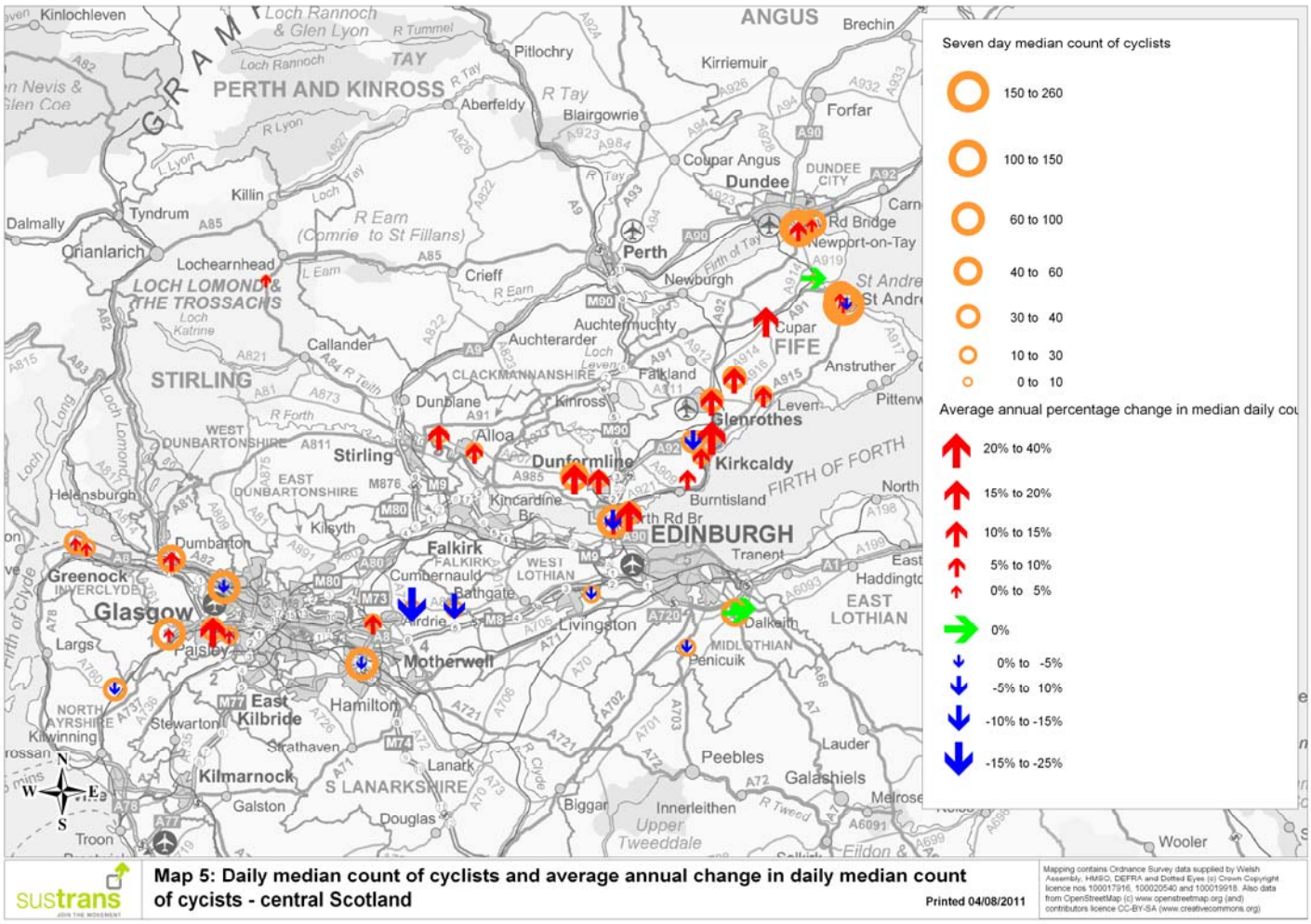
Map 4: Daily median count of cyclists and average annual change in daily median count of cyclists - southern Scotland

Printed 04/08/2011



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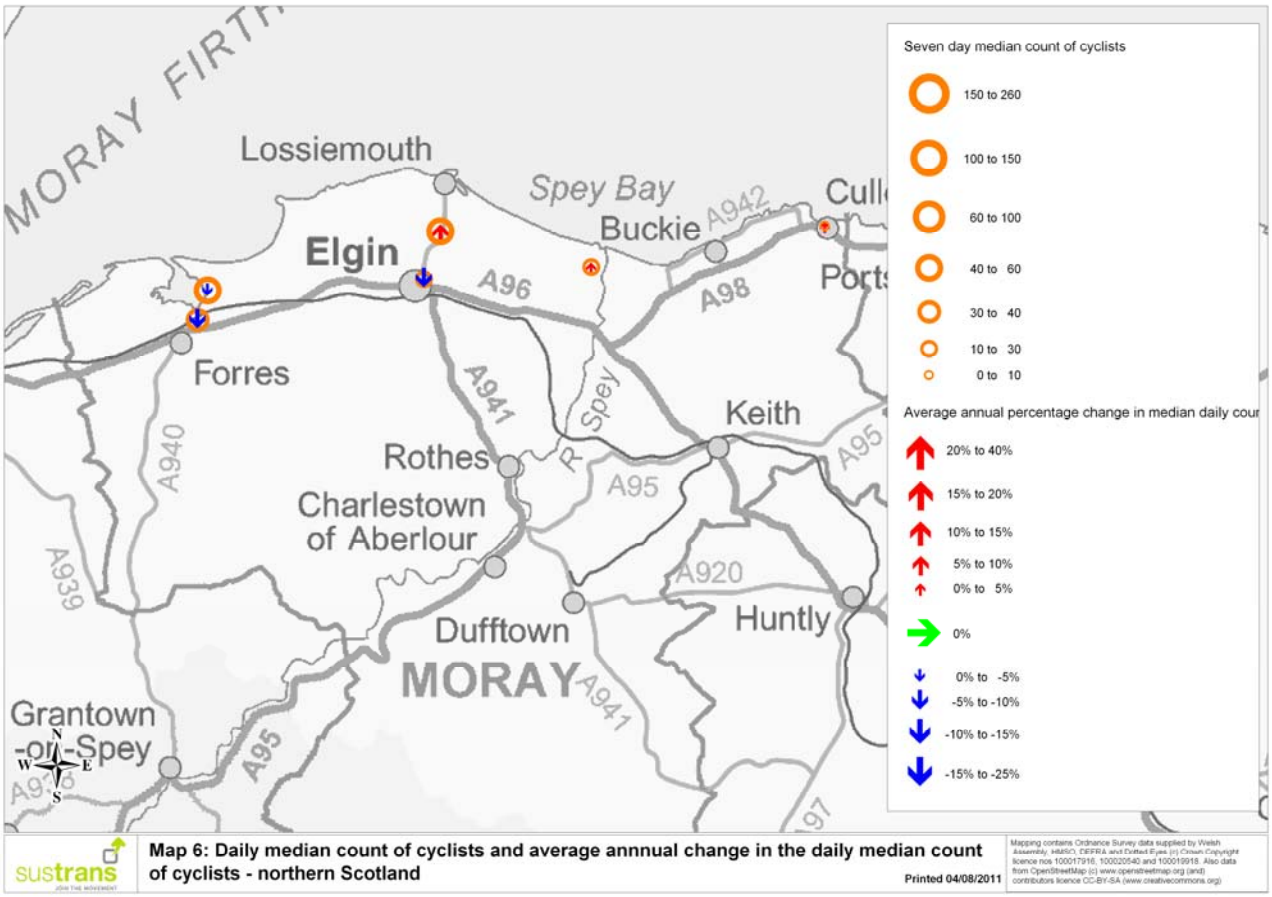
Map 5: Daily median count of cyclists and average annual change in daily median count of cycists - central Scotland

Printed 04/08/2011



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Map 6: Daily median count of cyclists and average annnual change in the daily median count of cyclists - northern Scotland

Printed 04/08/2011