The effectiveness of the brochure 'Garden Escapes'

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CONTENTS

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ABSTRACT

In its public awareness activities, the New Zealand Department of Conservation produces a variety of publicity and information materials, common among which are brochures. Little research has been completed to date to review and assess the effectiveness of such materials in changing public opinion and/or actions. This study used a model of responsible environmental behaviour as a framework and assessed, as an advocacy tool, the effectiveness of a brochure about the problems created by plant pests escaping from domestic gardens. Aspects of the study included determining the ability of the brochure to alter knowledge, perceptions, attitudes and, ultimately, behaviour. Three methods of distribution were investigated to ascertain whether the way in which the brochure was received had any impact on its overall effectiveness. From the results of face-to-face questionnaires, it was established that the brochure, by itself, did not have a significant effect on the recipients' level of knowledge. When the brochure was personally delivered or used in conjunction with a covering letter, it was able to influence recipients' levels of understanding. The effect of the brochure on attitudes, perceptions and behaviour was less evident. The objectives and position of brochures within the wider scope of public awareness strategies must be established well in advance of their production.

Keywords: brochures, invasive weeds, public awareness, responsible environmental behaviour, Hemi Matenga Scenic Reserve, Waikanae, New Zealand

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1. Introduction

The Department of Conservation (DOC) has a responsibility for educating and informing the general public on issues and concerns related to the conservation of New Zealand's natural and historical resources. The Department produces a variety of public awareness material, common among which are brochures. This material is used to convey many messages about environmentally responsible behaviour. Little research has been done on the effectiveness of such material in altering the knowledge, perceptions, attitudes, and behaviour of those who receive it.

This report assesses the effectiveness of the brochure 'Garden Escapes' in changing public awareness. This assessment is important as brochures are commonly used as relatively cost-effective and low-effort means of communication. Their small size makes brochures popular as an easily distributed source of information. It is often assumed that once a brochure is distributed the message has been read and accepted by recipients. The degree to which this is true needs to be tested so that the effectiveness and, hence, role of brochures within public awareness strategies can be ascertained.

The results documented in this report will have relevance throughout DOC, but should be particularly useful for conservation managers, public awareness staff and publications managers. The outcome of this research should be a better understanding of how to design and distribute brochures for optimum effectiveness.

1.1 AIMS AND OBJECTIVES

The aim of this investigation was to assess the effectiveness of the brochure 'Garden Escapes' in raising the awareness of those who received it. The objectives were to determine:

- What impact, if any, the brochure had on recipients' knowledge, attitudes, and perceptions relative to the issue of invasive weeds and their effect on native bush.
- If the brochure had, or is likely to have, any impact on recipients' behaviour.
- Whether various distribution methods have any impact on the effectiveness of the brochure.

The distribution methods assessed included:

- Delivery of the brochure into letterboxes.
- Delivery of the brochure and a covering letter[1] into letterboxes.
- Personal delivery of the brochure directly to the occupant of the household.

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[1] Using a covering letter in addition to the brochure is a practice used by DOC staff. The covering letter used in this survey draws attention to the issues of invasive weeds invading a scenic reserve in the study area (see Appendix 5). Refer to section 3.3 for further details.

In addition to these objectives, the robustness of any changes in knowledge, perceptions, attitudes, and behaviour were investigated. This was achieved by comparing results from groups who received the brochure 3 months prior to surveying with groups who received it 3 weeks before surveying. Aspects of the design and content of the brochure were also investigated.

1.2 THE BROCHURE 'GARDEN ESCAPES'

'Garden Escapes' is a colour-printed, triple-fold (eight-panel), double-sided brochure which explains the problems caused by plants escaping domestic gardens and spreading into native bush (see Appendix 1). The information contained within the brochure highlights why such plants are a threat and the problems that they cause. To supplement this information, a list is provided that indicates important biological characteristics of invasive weeds to assist in their identification. A photograph of known weed species accompanies each characteristic as an example. The brochure also provides a list of action strategies and disposal methods which individuals can undertake to prevent the spread of such plants.

The brochure was developed by Wellington Conservancy staff and produced in conjunction with the Wellington Regional Council in 1998. It was produced in response to an assessment of existing public awareness material dealing with invasive weeds. This assessment highlighted the need for a brochure to address the serious threat posed by garden rubbish and the escape of weeds from domestic gardens. 'Garden Escapes' was intended to fill this gap and to provide a resource which could be stand-alone as well as be used in conjunction with other public awareness material. It was designed to both inform and change/reaffirm appropriate disposal behaviour.

1.3 STUDY LOCATION

The town of Waikanae, situated on the Kapiti Coast, north of Wellington, North Island, New Zealand served as the locale for the study. This area was selected because of the large number of properties that bordered, or were in close proximity to, native bush. The most substantial area of bush is the Hemi Matenga Scenic Reserve, one of the largest remaining areas of kohekohe forest in the area. This area is of high conservation value and therefore at risk from invasive weeds escaping from domestic gardens. It is also characteristic of where DOC staff would distribute the brochure to households.

2. Literature review

One of the objectives of brochures produced by DOC is to create environmentally responsible individuals. The main way to achieve this goal is through adjusting or affirming appropriate behaviour. Education and public awareness material containing conservation information are avenues through which this behavioural alteration can be achieved (Boerschig & De Young 1993). It is hoped that the conservation messages, such as those contained in 'Garden Escapes', will either reinforce or modify peoples' behaviour so that it accords with what is desired by DOC.

2.1 RESPONSIBLE ENVIRONMENTAL BEHAVIOUR

Research investigating the elements necessary for the achievement of behavioural modification has identified certain factors as precursors to environmentally appropriate behaviour. These include such variables as knowledge, attitudes, and locus of control[2] (Hines et al. 1986). Though investigations into each separate variable have been plentiful, little work has been done on determining how these factors work in combination with each other and which have the strongest association with environmentally responsible behaviour.

To address this gap in the research, Hines et al. (1986) combined the results of over 120 studies to investigate what variables affect behaviour and how influential they are in motivating individuals to take responsible environmental action. The authors were able to identify the following variables and construct a proposed model for responsible environmental behaviour (Fig. 1).

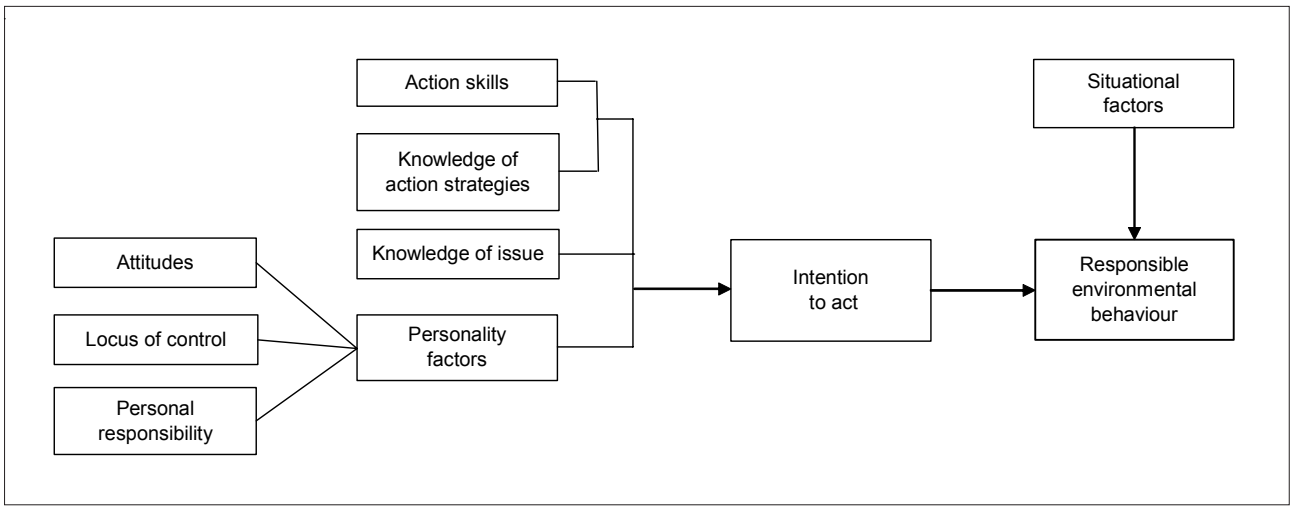

Figure 1. Proposed model of responsible environmental behaviour (from Hines et al. 1986)

[2] A positive locus of control is said to exist when an individual perceives their personal actions to make a perceptible difference to society as a whole, e.g. recycling domestic rubbish contributes to the reduction of waste generation for the community, city, etc. Conversely, a negative locus of control will lead an individual to believe that their contribution will not positively affect wider community efforts and so they might as well not engage in that behaviour.

Intention to act is identified as the key characteristic of change, for without it an individual is not as likely to engage in responsible behaviour (Hines et al. 1986). Intention is dependent on an individual's awareness of an issue and so knowledge of the problem is a fundamental variable (Hines et al. 1986; Berrenberg & Cook 1981). This is supported by Kuhlemeier et al. (1999) who explored the relationship between environmental knowledge and environmentally responsible behaviour. It was found that those with a fragmented and often incorrect knowledge of environmental problems had inadequate behavioural responses (Kuhlemeier et al. 1999).

Knowledge, however, needs to incorporate the comprehension of action strategies and the ability of the individuals to implement those strategies, thus providing an avenue for intention to be realised (Berrenberg & Cook 1981; Hines et al. 1986; Witter & Young 1994). Hines et al. (1986) stressed the importance of separating knowledge of the issue and knowledge of action strategies into two distinct categories. If only one knowledge component is provided to people, environmentally responsible behaviour is not as likely to eventuate. More importantly, it should not be assumed that increasing both knowledge of the issue and knowledge of action strategies will result in recipients developing the necessary skills to implement the knowledge.

Hines et al. (1986) also stated that knowledge and the ability to apply knowledge are not the only factors necessary to alter behaviour. The individual must also possess the 'personality' to do so. There is no sole characteristic that determines or defines such people or personality types, but there are certain elements that are identified as being favourable for an individual to be persuaded into behavioural change. For issues involving conservation, an individual who has a positive attitude towards the environment is more inclined to alter his or her behaviour than someone who does not (Berrenberg & Cook 1981; Hines et al. 1986). This also applies to individuals who have an internal locus of control, who believe they are capable of making a perceptible difference through their own personal actions (Hines et al. 1986). Not all individuals have the above attributes, therefore it is necessary for public awareness material to be persuasive so as to instil and reaffirm attitudes towards conservation.

Even if an individual does develop the intention to behave in an environmentally responsible way, he or she still may not carry out their intention (Berrenberg & Cook 1981). Economic constraints and social pressures may strengthen or weaken the other variables affecting a person, thus discouraging from acting in a particular way (Hines et al. 1986; Berrenberg & Cook 1981; Pettigrew 1996). Other situational factors include legislation and regulation, as with the Reserves Act 1997, for example, where dumping garden refuse inside the reserve is an offence. Such constraints and pressures warrant consideration.

Of the variables listed in the Hines et al. (1986) model, it is the 'personality' factors that have the strongest correlation with responsible behaviour, followed by knowledge. Successfully altering individuals' attitudes is more likely, therefore, to lead to appropriate behavioural adjustments than the provision of factual information.

2.2 MESSAGE RECEPTION

Before any conservation message can be expected to change behaviour, an individual must first be willing to receive it. The process of receiving a message is very complicated, as expressed by Pettigrew (1996: 10):

> 'It involves the individual's mindset, internal thought processing, external actions such as discussion and possible behaviour change, and various forms of social control. It is partly rational and partly emotive. The process is mediated by characteristics of the message itself, of the medium, the source, the timing of the communication, and other factors'.

How a brochure flows through these processes is partly determined by the physical attributes of printed material.

The value of the print medium is that it produces a physical product that is reasonably permanent. This allows the recipient to control the pace of message reception and to refer back to the material when they desire (Pettigrew 1996). A printed product, therefore, allows the recipient to read and respond actively to the message if they are inclined to do so, but also to completely skip the message by not reading it, if that is their desire. This is significant, as Wright (1974) suggested that it is the content of the message which has the predominant impact on message reception, followed by the medium. The implications of this are that if an individual is interested in the contents of the printed communication, the opportunity for them to gain information from it is improved. If they are not interested, however, the effectiveness of the communication is diminished as the message is easily avoided.

2.3 SHAPING KNOWLEDGE, ATTITUDES, AND PERCEPTIONS

Pettigrew (1996) noted that printed material allows for more factual information to be communicated than other media. With a printed message, the respondent has the opportunity to read and assimilate its contents at a pace that is most convenient for them. The opportunity for the recipient to increase their knowledge is then improved. Changes in attitudes are not so easily accomplished.

Attitudes are a way of regarding and evaluating directionality, i.e. the favourable or unfavourable feeling towards something (Bennett et al. 1999; De Young 1989; Ham & Kelsey 1998; Kobella 1989). Attitudes have been defined as 'a complex mental construct (perception) which emerges out of an integration of an individual's belief and value systems' (Boerschig & De Young 1993: 18). Attitude modification involves processes that are more fundamental and central to the way an individual relates to their surrounding environment. Attempting to change an individual's attitude is, therefore, an attempt to alter their personal paradigm, which constitutes their identity. As difficult as this may seem, attitudes can be taught and learned, therefore they are susceptible to alteration (Kobella 1989).

The basis for attitudinal change is persuasion. Persuasion involves communication 'which includes giving arguments and evidence for the purpose of getting someone to believe something or to do something' (Kobella 1989: 3). Analysis of the many proposed methods and models by which this can be achieved is beyond the scope of this discussion. However, there are useful conclusions that are relevant to this research; the most important being that changes in attitude are unrelated to gains in factual information and that persistence of change is unrelated with the ability of the recipient to recall message arguments. Also, the channel by which a message is presented does not seem to affect persuasiveness (Kobella 1989).

The above indications suggest that messages that seek to alter attitudes have to appeal to the more emotive aspects of an individual's personality and not through the cognitive approaches necessary in knowledge gain. Attitude modification is linked to recipients' 'self-generated thoughts' to a persuasive message. The challenge, then, is to determine what will generate the internal discussion necessary for attitude change in the intended receivers.

2.4 THE EFFECTIVENESS OF BROCHURES

There have been few empirical investigations into the effectiveness of brochures. The focus of public awareness research has centred on the effects of the mass media, i.e. television and radio. Of the few that have addressed brochures, most deal with the ability of brochures to impart information.

The main source of research on brochures comes from the health sector where direct mailing is commonly used. Direct mailing is a distribution method and involves the mailing of brochures that are accompanied by a fact sheet/letter addressed to the recipient (Placek 1974; Finnegan et al. 1985). The additional fact sheet/letter highlights the personal relevance of the information that the brochure contains. This method is not unlike current practice within DOC as fact sheets and letters accompany a number of brochures released.

Studies of the effectiveness of brochures distributed via direct mailing in health campaigns indicate that brochures are effective in increasing knowledge of the topic being communicated (Placek 1974; Finnegan et al. 1985). In both studies cited, there were significant differences in the level of knowledge between those who had read the information and those who did not.

Although the brochures were shown to be effective in conveying information, the overall knowledge increase of the population sampled was minimal. Finnegan et al. (1985) found that only 14% of people that received the information actually read it. This result was surprising considering that the content of the brochure was directly related to the recipients own personal health issue. Nonetheless, results of this nature highlight the deficiencies involved in using brochures and other print material as the medium to convey information. While it is relatively easy to expose individuals to brochures, the exposure is only effective if the recipient is inclined to receive the message.

Whether the recipient is inclined to respond to a message is dependent on many factors. Aside from issues such as personal relevance, cultural and social factors

are critical. The level of literacy, education, and the acceptability of and familiarity with written communication methods will have an influence. These factors require consideration in the development of printed public awareness material.

The results from the two medical studies can be tentatively applied to brochures containing other public awareness material. The brochure 'Garden Escapes' would be expected to be effective in conveying its conservation message to those who are exposed to it. The issue of reading rates is obviously an important area of concern, however. Depending on the nature of the target population, it would be expected that reading rates would differ. It should also be considered that the distribution method employed in the medical studies will have influenced reception and reading rates. The additional information provided by the covering letter might influence or strengthen the messages in the brochure. The effects of different distribution methods, therefore, need to be investigated.

2.5 DESIGN AND PRESENTATION OF BROCHURES

Simply providing information on environmental issues is not sufficient to alter behaviour and, in some cases, may not be sufficient to increase individual knowledge (Witter & Young 1994). Presentation and design are important aspects of increasing the potential of brochures to improve knowledge and alter the perceptions of individuals.

In a study of the effectiveness of brochures in increasing knowledge of the biology and management of gypsy moths, design and content issues were examined to provide guidelines for the most effective methods of presenting information (Witter & Young 1994). Results from the study supported those for direct mailing, with individuals who read the brochure having an increased knowledge of both the management and biology of the gypsy moth than those who did not.

Variations in the content and design of the brochures examined had only a minimal effect on the comprehension of the information they contained. The study investigated brochures that differed in characteristics of communication effectiveness and nearly all resulted in an equivalent knowledge rating. Consequently, it was not possible to identify what kind of information or design was most useful for increasing knowledge. This suggests that many alternative methods of design may produce effective brochures (Witter & Young 1994). No information was reported on whether the content or design affected if people read the brochure.

Though the investigation into the gypsy moth brochure failed to identify effective content and design aspects, useful guidelines could still be extracted. It was shown that brochures which included messages that were personalised, had limited jargon, and that contained information on action strategies, were relatively more effective than those that did not (Witter & Young 1994).

Photographs and other visual cues were also identified as having a positive influence on the comprehension of information. Why this was the case was

never explained, although it was suggested that visual confirmation of the written facts increased comprehension due to the reader being 'drawn into' the material (Witter & Young 1994).

The results from the Witter & Young (1994) research should be viewed with caution, however. Apart from having a low return rate of questionnaires and, therefore, limited results for statistical analysis, the methodology proved to contain one fundamental error. The mail-return questionnaire was provided to the recipients of the brochures and it was not possible to ensure that the respondents did not use the brochures as a reference to complete the questionnaire.

2.6 IMPLICATIONS FOR THIS RESEARCH

The proposed model of responsible environmental behaviour provides a useful framework against which the effectiveness of 'Garden Escapes' can be assessed. Such a brochure cannot be expected to attend to all the variables listed in the model, but investigations into the brochure's influence on the level of knowledge, attitudes, and perceptions may provide an indication of potential behavioural responses and, therefore, its overall effectiveness.

'Garden Escapes' provides for at least two of the factors identified in the model of responsible environmental behaviour. Knowledge of the issue and knowledge of action strategies are central to the contents of the brochure with six of the eight panels devoted to these subjects. The brochure also has numerous photographs of invasive weeds which Witter & Young (1994) suggested will aid in comprehension of the information. Overall, the brochure is geared towards increasing knowledge.

It is difficult to comment on whether the brochure provides for any of the other factors listed in the model, as the remaining panels do not directly address areas such as attitudes, locus of control, or personal responsibility. Similarly, the brochure's effect on action skills is undeterminable as providing information on action strategies does not necessarily provide the actual skills an individual needs to actually take action (Hines et al. 1986).

The covering letter used in this investigation does not provide for any of the knowledge variables listed in the Hines et al. (1986) model and, therefore, differs significantly in this respect from the brochure. In addition, it clearly states that the control of the listed weed species on an individual's property is the responsibility of that individual and highlights the direct benefits of their actions. The attributes of the covering letter could attend to the variables listed in the model of responsible environmental behaviour (Fig. 1) not covered by the brochure, such as personal responsibility and attitudes.

Based on this analysis, it can be expected that using the brochure in conjunction with a covering letter will be the most effectives in increasing the level of knowledge of recipients. The effect of the brochure on attitudes, perceptions, and behaviour is more difficult to predict as this is an area which has received little attention in previous research.

3. Methodology

This section provides a brief overview of the methodology employed in assessing the effectiveness of the brochure 'Garden Escapes'. For more detailed and technical information on the methods used, please refer to Appendix 2.

3.1 OVERVIEW

Seven hundred households in the Waikanae area were randomly selected to participate in this investigation. Of this 700, 100 were selected for the control group[3] with the remainder divided into seven experimental groups. Each experimental group received the brochure through one of three methods of distribution. The three methods were:

- Delivery of the brochure only into letterboxes
- Delivery of the brochure plus covering letter into letterboxes
- Personal delivery of the brochure to the occupants of the household

Each method of distribution was used at two different times prior to surveying. The first release was completed in March 2000, three months before surveying, while the second completed in June 2000, three weeks before surveying. These intervals were selected to:

- Provide sufficient time for any increases in knowledge, attitudes, etc. to manifest as behavioural change.
- Provide a comparison between the different releases that could identify the robustness, over time, of any knowledge or attitudinal change that the respondents may have developed.

Table 1 shows the breakdown of the groups and the number of people selected for each.

In addition to the control and experimental groups, 100 households surrounding the Hemi Matenga Memorial Reserve were surveyed. This area had been exposed to the brochure in a campaign conducted in 1998. The brochure was delivered with a covering letter. Investigating these households allowed analysis of the long-term effects of the brochure on knowledge, behaviour, etc.

A fully structured questionnaire was developed to assess the brochure (see Appendix 3). The questionnaire consisted of five sections, the first three of which were devoted to the perceptions and attitudes, knowledge, and behaviour of the respondent towards invasive weeds. The fourth section referred directly to the brochure. The last section collected demographic information on the respondents. The questionnaires were presented and completed by respondents in the presence of a surveyor. The reasons for this are listed below (section 3.2).

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[3] The control group consists of respondents who were not exposed to the brochure. This group is used as a comparison to the experimental groups to determine if the brochure had any affect on knowledge, attitudes, etc.

TABLE 1. VARIABLE GROUPS AND NUMBER OF PARTICIPANTS IN EACH GROUP.

VARIABLE GROUP		NO. OF HOUSEHOLDS SELECTED
Control		100
Distribution conducted in 1998		100
March distribution	—brochure	100
	—brochure and letter	100
	—personal delivery of brochure	50
June distribution	—brochure	100
	—brochure and letter	100
	—personal delivery of brochure	50
TOTAL		700

Surveying was predominantly completed during the day, Monday to Friday. To capture those who normally work during this period, surveying was also conducted some evenings and on weekends.

3.2 QUESTIONNAIRE

The questionnaire was completed in front of a surveyor. The reasons for this were:

- People are less inclined to refuse to complete the questionnaire in the presence of the surveyor, contributing to higher response rates.
- If, by chance, the respondent identified the connection between the questionnaire and the brochure, they would not have the opportunity to obtain their own copy of 'Garden Escapes' and use it as a reference to complete the questions.
- The fourth section of the questionnaire required the presentation of the brochure 'Garden Escapes'. Other visual cues were necessary in the completion of the survey. Presentation of the brochure could not be done directly prior to completion of the questionnaire, as this would bias respondents' answers. It was therefore necessary for a person to be in attendance so that the brochure could be presented at the appropriate stage.
- The surveyor could facilitate questionnaire completion by clarifying any questions or queries the respondent may have had.

Five surveyors were trained and administered the questionnaires. Surveyors identified themselves as university researchers. Each respondent was given an information sheet (Appendix 4) detailing the purpose of the questionnaire, which was stated to be an investigation into knowledge and behaviour relative to invasive weeds. Direct reference to Garden Escapes was not made. This was done to remove elements of bias that could enter the results through respondents realising their comprehension of the brochure was being tested. This approach is supported by Placek (1974) and Finnegan et al. (1985). After completion of the questionnaire the respondents were informed as to the actual nature of the research.

3.3 BROCHURE DISTRIBUTION

The different modes of distribution were used to determine if varying the way people received the information altered the effectiveness of the brochure. The methods included:

- Delivery of the brochure only into letterboxes
- Delivery of the brochure plus covering letter into letterboxes
- Personal delivery of the brochure to the occupants of the household

Using a covering letter in addition to the brochure is a practice used by DOC staff. The covering letter used in this survey draws attention to the issues of invasive weeds invading Hemi Matenga Scenic Reserve and was produced by DOC staff (see Appendix 5). It specifies the invasive weeds that threaten the reserve, almost all of which are identified visually in the brochure. It also notes that dumping garden refuse inside the reserve is an offence under the Reserves Act, 1997.

Personal delivery of the brochure to the occupants of the household is another method used by DOC staff. This mode of delivery serves a similar purpose to the covering letter, as the individual delivering the brochure draws attention to the issues raised in the brochure. The delivery of the brochure was completed by the researcher who stated to household occupants that they were a volunteer helping area staff with the delivery of the brochure.

All distributions were completed by the researcher.

4. Results and discussion

This section provides the results derived from the completed questionnaires and descriptions and results of the statistical testing used. Throughout the contents of this section, the distribution and variable groups used have been abbreviated. The abbreviations used are given in Table 2.

TABLE 2. ABBREVIATIONS USED FOR VARIABLE GROUPS.

VARIABLE GROUP		ABBREVIATIONS
Control		C
Distribution conducted in 1998		HM(2)
March distribution	—brochure	MB
	—brochure and letter	MBL
	—personal delivery of brochure	MP
June distribution	—brochure	JB
	—brochure and letter	JBL
	—personal delivery of brochure	JP

4.1 RESPONSE POPULATION

Four hundred and two surveys were completed out of a possible 700, resulting in a return rate of 57%. Table 3 lists the number of questionnaires collected for each variable group.

TABLE 3. NUMBER OF QUESTIONNAIRES COLLECTED PER VARIABLE GROUP.

VARIABLE GROUP	NO. OF HOUSE-HOLDS SELECTED	NO. OF QUESTION-NAIRES COLLECTED	PERCENTAGE COLLECTED
C	100	47	47.0
HM (2)	100	44	44.0
MB	100	61	61.0
MBL	100	54	54.0
MP	50	39	78.0
JB	100	59	59.0
JBL	100	58	58.0
JP	50	40	80.0
TOTAL	700	402	57.4

4.2 DEMOGRAPHICS

Of the 402 respondents who completed the questionnaire, 28% (113) did not offer a response to the questions in the demographic section. Analysis of the remaining surveys showed that 60% (174) of respondents were women. The median age of participants was 53 years with 91% (263) owning their own home.

Census data, collected in 1996, reports that the average age of the national population is 34.8 years, which is considerably younger than the average age of respondents (Statistics New Zealand 1997a). The older age of the respondents is not surprising given the demographic nature of the Kapiti Coast District. The Regional Summary of the 1996 census reports that this district is a popular retirement destination, with more than 20% of the district's population aged 65 years and over. This compares with 11% for the Wellington region (Statistics New Zealand 1997b).

The high percentage of homeowners can also be attributed to the Waikanae area being a retirement destination. The 91% of respondents owning their own home was significantly higher than the national average of 68% (Statistics New Zealand 1997a)[4].

The higher proportion of women than men respondents can also be linked with the older average age of respondents. Women tend to live longer than men, which results in women dominating older age cohorts (Statistics New Zealand 1997a). The high proportion of women in the sample might also be attributed to more women than men being at home at the time the survey was carried out, especially among households with young children.

Most participants were well educated, with those having completed a tertiary qualification making up 36% (104) of the group surveyed; well above the national average of approximately 10% (Statistics New Zealand 1997a). A further 14% (41) of respondents indicated some tertiary education. The percentage of respondents that had completed secondary school, or had some secondary schooling was 20% (57) and 29% (85) respectively.

Given that Waikanae is a popular retirement destination, there is an increased likelihood that the sample may pay more attention to the brochure due to interests in gardening. A likely result could be increased reception and reading rates. This may amplify results concerning the effectiveness of the brochure. The sample also appears to be relatively homogeneous in terms of home ownership, age, and education. Consequently, conclusions about the effectiveness of brochures in changing knowledge, attitudes and behaviour need to be considered cautiously and within this context.

4.3 RECOLLECTION AND READING RATES

Three hundred and fifty-five questionnaires were collected from individuals selected for the experimental groups. Of these 355 respondents, 42% (148) stated that they had seen the brochure distributed for this study. The summary of recollection and reading rates is listed in Table 4.

The highest number of those who recalled seeing the brochure was from the most recent (June) distribution. Each variable category for the June distribution scored consistently higher than the same variable for the March distribution.

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[4] This figure was calculated using private dwelling numbers. Categories included: 'owned with a mortgage', 'owned without mortgage', and 'owned, mortgage not specified'.

TABLE 4. RECOLLECTION AND READING RATES FOR ALL EXPERIMENTAL GROUPS.

VARIABLE GROUP	TOTAL NO. OF COMPLETED QUESTIONNAIRES	NO. RECALLED SEEING BROCHURE	PERCENTAGE RECALLED SEEING BROCHURE	NO. WHICH READ BROCHURE	PERCENTAGE WHO READ BROCHURE
HM (2)	44	10	22.7	10	22.7
MB	61	20	32.8	19	31.1
MBL	54	18	33.3	16	29.6
MP	39	20	51.3	18	46.2
JB	59	24	40.7	22	37.3
JBL	58	32	55.2	30	51.7
JP	40	24	60.0	23	57.5
TOTAL	355	148	41.7	138	38.9

The variable which recorded the highest percentage of those who recalled the brochure was personal delivery, followed by the brochure and letter, then the brochure on its own. This trend was consistent through both distribution sets.

Two of the 47 respondents returning a questionnaire for the control group indicated that they had seen the brochure. These respondents were removed from the sample.

Of the 148 respondents who recalled having seen the brochure when distributed to them, a further 10 were removed from the survey as they had not read it. Only the respondents who stated that they had read the brochure were used in determining its effectiveness.

4.4 KNOWLEDGE

To ascertain whether the brochure had any influence on the level of understanding of those who read it, the questions investigating knowledge were directly related to the information presented in the brochure. Areas covered by the survey questions include:

Q 8: Identification of official invasive weed species via photographs.

Q 9: Recognition of potential invasive weeds by way of their biological characteristics.

Q 10: Identification of the most important reasons why a plant may be viewed as a weed.

Q 11: Identification of invasive weeds by name.

Q 12: The best ways of disposing of invasive weeds

Q 13: The worst ways of disposing of invasive weeds

4.4.1 Analysis

Differences in knowledge were determined by calculating how many of the 6 knowledge questions each respondent answered correctly. Table 5 shows the mean knowledge score and standard deviation for each of the variable and control groups.

TABLE 5. MEAN KNOWLEDGE SCORES FOR EACH VARIABLE AND CONTROL GROUP.

VARIABLE GROUP	NO. OF CASES	MEAN	STANDARD DEVIATION
C	45	2.3	1.6
HM (2)	10	3.0	1.7
MB	19	3.2	1.5
MBL	16	4.0	1.6
MP	18	3.3	1.7
JB	22	3.1	1.6
JBL	30	3.6	1.4
JP	23	3.4	1.4
TOTAL	183		

All variable groups recorded a mean knowledge score higher than the control. Testing of the mean knowledge scores indicated that both distributions of the brochure and letter variable significantly differed from the control[5]. The June personal delivery variable also proved to be significantly different.

There were no significant differences between the knowledge scores of respondents who did not recall receiving the brochure and those of the control group. This suggests that the different scores recorded for respondents who read the brochure were valid and were the consequence of exposure to 'Garden Escapes'.

Question 11, which asked respondents to identify invasive weeds by name, was the only question which registered significant differences in the knowledge scores between groups. In this case, the brochure plus letter variable for both distributions differed significantly from the control for this question.

Although only Question 11 returned a significant result some trends were identifiable in data sets. In analysing the number of correct answers given by each group for each question, it was found that the brochure plus letter variable for both distributions and the June personal delivery variable consistently scored higher than the average in five out of the six knowledge questions (Fig. 2). These findings suggest that the brochure and letter variable had increased knowledge scores across most questions.

Question 8, which asked respondents to visually identify selected invasive weed species, provided the lowest average score. Of the 138 respondents from the experimental groups, only 52 (38%) answered this question correctly. This result was not surprising, as during surveying it was noted that on several occasions, people mis-identified Japanese honeysuckle as banana passionfruit, another invasive weed species. In addition, very few respondents correctly identified climbing asparagus, one of the other weed species.

The average score of the remaining knowledge questions was approximately 50% with the exception of question 13. In this case, 138 (85%) of respondents gave correct answers, indicating that most people have a very good idea of how not to dispose of invasive weeds.

[5] Testing procedures are detailed in Fraser 2001.

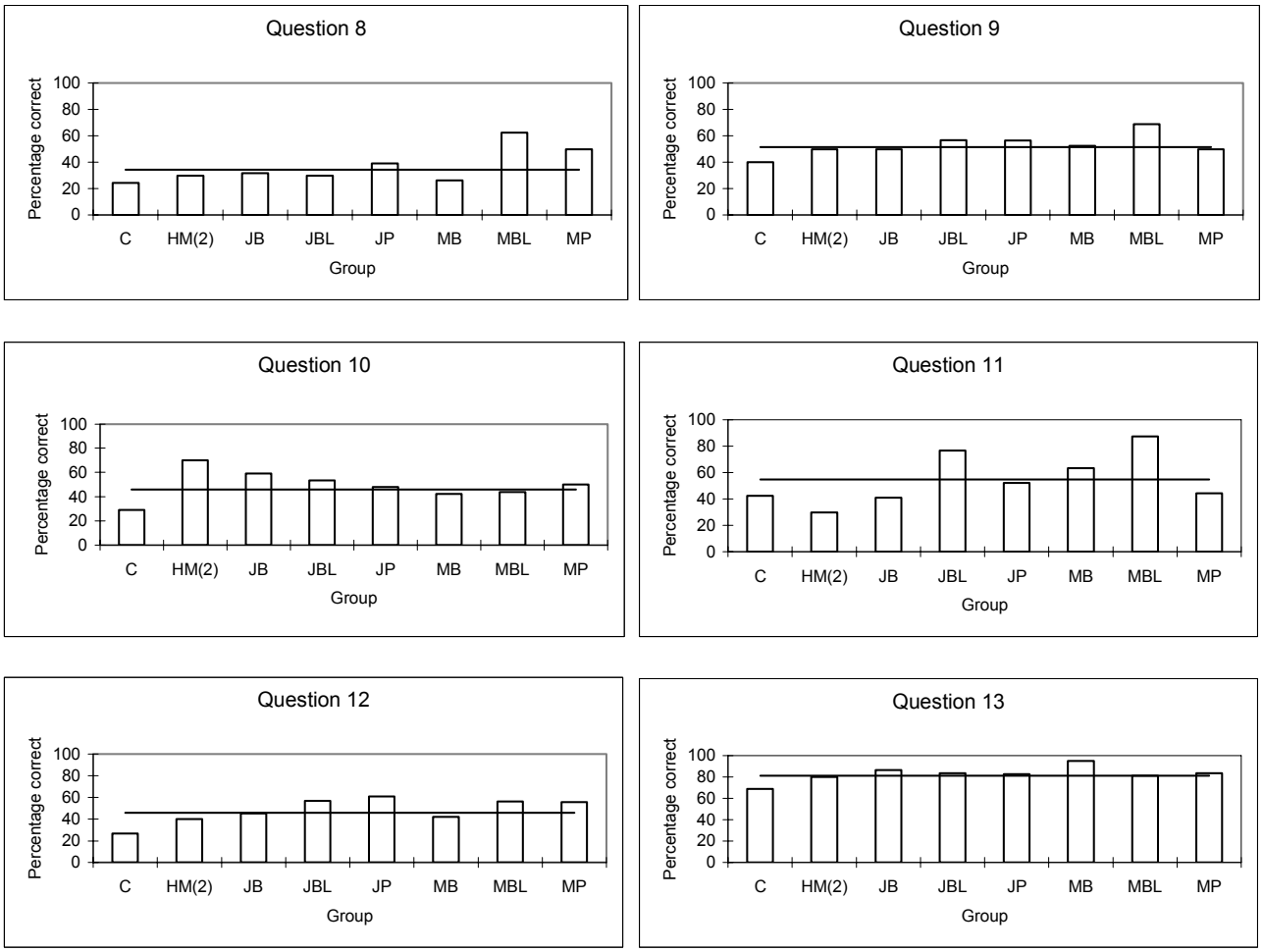

Figure 2. Percentage of correct responses versus average score for each knowledge question (horizontal line indicates average score).

The control group consistently scored lower than the average for all six questions.

4.4.2 Discussion

The brochure plus covering letter appears to be the most effective in terms of increasing knowledge as both distributions of this variable were significantly different from the control. The consistency of results also suggests that knowledge gain was enduring over time.

The results for the June personal variable delivery were also significantly different from the control, but this was not the case for the March variable. A possible interpretation of this result is that personal delivery is only effective in altering the level of knowledge over the short-term. The personal delivery variables recorded the highest percentage of participants who remembered seeing the brochure in each distribution set, outscoring the brochure/letter variable in both instances. However, this high level of recall of the brochure was not subsequently reflected in the knowledge scores.

The consistently better scores for the brochure plus letter variable indicates that it is a more effective method than personal delivery, yet why this is so is not immediately apparent. The opportunity for dialogue and discussion provided by

personal delivery, coupled with the high reception rate, would suggest that personal delivery would be more effective than the brochure plus letter in increasing knowledge. The different results may relate to the reception environment.

The reception environment is fundamental to whether a message receives attention. The brochure plus letter may induce an environment more favourable to message reception as the recipient can peruse what they have received, and then select whether they want to read it. This effect may be enhanced by the ability of recipients to refer back to the letter, an option not available when the message is delivered personally. Alternatively, personal delivery is an unusual and distinctive method of receiving information. This may lead to a higher number of people remembering receiving and seeing the brochure. However, the opportunity to refer back to the information provided by the deliverer is obviously not present. This may lead to people receiving the brochure, but then examining it only cursorily.

The brochure by itself did not appear to improve knowledge of those who received it. This method of distribution recorded the lowest reception rate and the lowest knowledge scores of the experimental variables listed[6]. The relative ineffectiveness of the brochure indicates a considerable variation in the ability of brochures to convey information, dependent on what distribution methods are used.

The brochure plus letter scored the only statistically significant difference from the control in the analysis of each individual knowledge question. This difference was in the respondents' ability to identify invasive weeds by name. In this case, the information in the brochure and the covering letter were complementary in that both materials identified the invasive weeds used in the questionnaire. The reinforcement provided by the letter and the brochure may explain this result.

Although the brochure plus letter variable appeared to assist in the identification of certain weeds by name (Question 11), this did not occur in Question 8, which asked the same question, but used pictures instead of names. In fact, very few respondents from any group could identify two out of the three plants shown. This indicates that the respondents knew invasive weed species by name, but not what they looked like. This signals a gap in the knowledge of the sample groups which could have ramifications in how they dispose of invasive weeds.

Providing factual information on disposal of invasive weeds will only be effective if the recipient can identify the plants. The brochure, however it was distributed, had no significant effect on recipients' knowledge of the biological characteristics of invasive weeds. The inability to properly identify weed species is likely to lead to inappropriate disposal behaviours as people will not be able to differentiate harmless plants from invasive weeds. Other public awareness strategies may need to be employed to improve peoples' skills visually identifying invasive weeds.

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6 With the exception of the distribution conducted in 1998.

The results of the survey also indicate that the brochure seemingly had no effect on respondents' ability to identify the more important reasons a plant may be viewed as a weed. This is interesting, as it is likely that most respondents know that invasive weeds, by their very nature, are harmful plants, yet couldn't identify how they are harmful. Hines et al. (1986) stressed that knowledge of the issue is a fundamental variable in the development of an individual's intention to act in an environmentally responsible way. Although the realisation that weeds are harmful may assist in the development of intention, the absence of a real understanding of the main issues could mean that inappropriate behaviour may continue; for example, dumping unwanted vegetation in or along the edge of areas of bush. The respondents' knowledge of the main issues involved with the potential effects of invasive weeds on native bush, obviously, requires further enforcement.

4.5 ATTITUDES AND PERCEPTIONS

Questions 1 to 3 were constructed to assess respondents' perceptions about invasive weeds. Question 4 was used to assess respondents' perception of the relevance of the brochure 'Garden Escapes', while Questions 5 to 7 were included to determine attitudes (of what). These topics were evaluated using five-point Likert scales which ranged from strongly agree (5) to strongly disagree (1). Questions 1 to 7 are listed below:

Q 1: Garden plants are able to establish themselves outside property boundaries

Q 2: If garden plants (could/can) establish themselves outside property boundaries, they should be considered as pest plants.

Q 3: In general, plants in domestic gardens/properties can invade native bush

Q 4: the plants in my garden can invade native bush.

Q 5: I would change my behaviour if it were found that my current practices were causing the spread of pest plants.

Q 6: I would remove my favourite garden plant if it were identified as a pest.

Q 7: I consider myself to be a person that engages in environmentally friendly gardening practices.

Note: 'pest plants' were used in replacement of 'invasive weeds' to avoid potential bias. See Appendix 2 for further explanation.

4.5.1 Analysis

Question 7 was the only question to report a significant difference from the control. This involved the June personal delivery variable.

Means, medians, and standard deviations were calculated to identify trends in the data sets. The results of these analyses are summarised in Table 6.

The results from Questions 1 and 3 suggest that a large proportion of people believe that garden plants are able to establish themselves outside property boundaries and that they can also invade native bush. Over 75% (106) of respondents selected one of the agree options for both questions.

TABLE 6. MEANS, MEDIANS, AND STANDARD DEVIATIONS FOR QUESTIONS 1–7.

	QUESTION													
	1		2		3		4		5		6		7	
	EG	C	EG	C	EG	C	EG	C	EG	C	EG	C	EG	C
Median	5.0	4.0	4.0	3.0	4.0	4.0	3.0	3.0	5.0	5.0	5.0	5.0	5.0	4.0
Mean	4.3	3.9	3.6	3.4	3.6	3.8	3.1	2.8	4.7	4.6	4.6	4.6	4.4	4.1
Standard deviation	0.9	1.0	1.2	1.1	1.2	1.2	1.4	1.4	0.6	0.6	0.8	0.6	0.9	0.9

EG = experimental group (138 responses)
C = control (45 responses)

Comparatively, only 54% (74) agreed overall with question 2, which asked whether garden plants establishing themselves outside property boundaries should be considered as pest plants. The neutral category was selected the most with 28% (39) of responses.

Question 4, which asked whether the respondent believed that the plants in their garden could invade native bush, produced a mean and median of 3. The responses were relatively evenly distributed around this mark with 'strongly disagree' receiving 17% (24) of responses and strongly agree receiving 22% (30). The disagree and agree options both recorded 18% (25). Similar results were recorded for the control group.

Questions 5, 6, and 7 all reported a median of 5 and a mean close to 4.5 for the experimental groups. Only 7 respondents disagreed or strongly disagreed in Questions 6 and 7 and in question 5 no-one selected an option below neutral. This indicates that most believe that they would alter their behaviour if found that their current practices were not appropriate.

As the experimental groups did not differ significantly from the control, it is likely that most held these positive attitudes before being exposed to the brochure.

4.5.2 Discussion

Attitudes and perceptions

The survey indicates that the ability of the brochure to have a positive effect on attitudes and perceptions was limited. The similarity of responses between the control group and the experimental groups suggest that most respondents had positive attitudes towards conservation prior to the survey. It cannot be expected that 'Garden Escapes' would have any great success in installing positive attitudes and perceptions in recipients if they already hold such views.

There are, however, important implications from the results. The earlier finding (section 4.4.2) that most respondents were incapable of properly identifying invasive weed species, combined with the significant proportion of respondents who were unsure or disagreed that plants which escape gardens should be considered as pests (Question 2), means that there may be nothing preventing such individuals from putting their garden refuse over their fence (under the impression that it was all harmless plant material) and believing they had done nothing wrong. These findings indicate that DOC and other organisations may need to develop public awareness strategies to help people

identify which garden plants are likely to become weeds and to change their perception about them.

Personal relevance of 'Garden Escapes'

Perceived personal relevance of the information is important in message reception and Question 4 was specifically included to address this issue. It asked whether the respondent considered the plants in their garden were a threat to native bush.

There was an even divide between those who agreed with Question 4 with those who disagreed. The relatively large proportion of respondents who did not believe their plants could invade native bush was unexpected, as it could easily be assumed that most individuals would be aware of the substantial sections of native bush in the area. However, a common response that accompanied the selection of one of the disagree options by respondents was that they 'did not reside close to native bush'. This comment was even made by homeowners whose property bordered the scenic reserve. If this misperception was common on the boundaries of a native bush reserve, it is likely that people who reside further away will share the same misperception. The implications of such misperceptions are worrisome, especially as it is pointed out in the brochure that some invasive weeds have the ability to establish themselves kilometres away from their original position. To prevent weed invasions of forest reserves in the area surveyed all residents must to be alerted to the fact that most reside close to native bush and that the plants in their garden have the potential to adversely affect the bush, as many do not believe this to be so.

The results from Question 4 also lend some insight and provide a possible explanation into the results recorded in the assessment of knowledge. The brochure plus letter variable recorded the most significant differences from that of the control in knowledge scores. In addition, the brochure plus letter variable reported a higher number of those agreeing with the statement that the plants in their garden have the potential to adversely affect native bush. By implication, these respondents acknowledge, perhaps unwittingly, that the information in the brochure is relevant to them. As personal relevance is fundamental in deciding which messages people read and which they ignore, these results imply that the covering letter not only lead to increased knowledge, but also improved recipients' perceptions of relevance of the brochure and the information it contained.

4.6 BEHAVIOURAL CHANGE

To determine if the brochure had any effect on behaviour, respondents were asked if they had altered any aspect of their behaviour as a consequence of reading it.

4.6.1 Analysis

Of the 138 respondents who indicated that they had read the brochure, 15% (20) said that their behaviour had changed as a direct result of its contents. The

personal delivery variable for the March distribution recorded the highest number of acknowledged changes in behaviour with six individuals. Table 7 provides a summary of results.

Most individuals believed they had either become more aware and vigilant of the plants in their garden (8) or had initiated some of the appropriate disposal behaviours that had been identified in the brochure (8). Two respondents indicated behavioural adjustments though they either did not know or were unsure as to how, exactly, their behaviour had changed. One respondent stated that he or she no longer dumped garden waste.

TABLE 7. INDICATED BEHAVIOURAL CHANGE.

VARIABLE GROUP	NO. THAT READ THE BROCHURE	NO. INDICATING BEHAVIOURAL CHANGE	PERCENTAGE OF TOTAL
HM (2)	10	2	20.0
MB	19	3	15.8
MBL	16	2	12.5
MP	18	6	33.3
JB	22	3	13.6
JBL	30	3	10.0
JP	23	1	4.4
TOTAL	138	20	14.5

4.6.2 Discussion

There are many factors which determine whether an individual will develop an intention to act in an environmentally responsible manner. The investigation into the effectiveness of 'Garden Escapes' has only addressed a few of the factors listed in the model presented by Hines et al. (1986), namely knowledge, attitudes, and perceptions. This study found that the brochure does have the ability to alter the level of knowledge of those that receive it, but only under certain conditions. The persuasiveness of the brochure in influencing perceptions and attitudes was, however, less evident. A valid prediction of the ability of the brochure to alter behaviour, therefore, is not possible. Any indications of the influence of the brochure on behaviour must, then, come from the recipients themselves.

As it is unlikely that respondents would like to be seen as unwilling to adopt environmentally appropriate behaviour, results of such questions have to be treated with caution. For this reason, these results were compared with responses from an earlier question (Question 16) which asked respondents if their methods of weed disposal had changed in the previous two years. Only the 8 individuals that indicated changes in actual disposal methods could be used for such analysis, as the remaining 12 had stated that their behavioural adjustments did not involve disposal. Comparisons showed that only 1 of the 8 respondents answered the two questions consistently. This raises questions concerning the validity of the responses given and that most respondents indicated behavioural changes as a reaction to being surveyed as opposed to actual behavioural modification.

4.7 THE BROCHURE 'GARDEN ESCAPES'

In addition to identifying whether the brochure was effective in changing knowledge, attitudes and, eventually, behaviour, aspects of the production and content of the brochure were investigated. This included identifying the source, the message, and possible improvements to the brochure.

4.7.1 Analysis

Source of 'Garden Escapes'

Sixty-one percent (86) of respondents indicated that DOC was responsible for the production of the brochure. The next most common response was 'don't know/unsure' with 31% (44) of respondents. Six percent (9) of respondents believed the Regional Council as the source of 'Garden Escapes'. Both the Ministry for the Environment and 'other' recorded 1% of responses.

Main message of the brochure

A majority of individuals had a good understanding of the main messages of 'Garden Escapes'. Table 8 shows the breakdown of responses.

TABLE 8. MAIN MESSAGE OF 'GARDEN ESCAPES'.

MESSAGE	NO. OF RESPONDENTS	PERCENTAGE OF TOTAL
Garden plants have the potential to adversely affect native bush	56	40.6
Proper disposal can prevent the dispersion of pest plants	45	32.6
How to Recognise and identify invasive weeds	26	18.8
Exotic pants can escape from domestic gardens	6	4.3
Other	10	7.2
Don't know	8	5.8
	(N=138)	

Note: Percentages do no total 100 because of multiple responses from respondents.

The first two categories recorded the highest scores (collectively, 50% of total responses). These categories represented the different aspects of the knowledge category listed in the model of responsible environmental behaviour. One directly addressed the issue, while the other is related to action strategies. The almost equal response rates are perhaps indicative of the different ways in which an individual may perceive a message, and what attributes of the communication become the focus of their personal analysis.

Perceived information gain

Respondents were asked if they had learnt anything from reading the brochure. This question was included to identify what aspects of respondents' knowledge had increased and, thus, which areas the Department may wish to focus on in future advocacy campaigns.

Of the respondents who had read the brochure, 45% (62) indicated that they had not learnt anything from it. A common response was that respondents were

already familiar with the information, that it was not new to them. The breakdown of the remaining responses is represented in Table 9.

The most significant area of perceived knowledge gain was in the identification of invasive weeds species. This occurred through either visual identification provided by the photographs and listing of pest plant species in the brochure or through the plants' biological characteristics. The next most popular response, besides that of don't know/unsure, was the realisation that garden plants do have the potential to adversely affect native bush.

TABLE 9. SUBJECT OF RESPONDENTS' PERCEIVED KNOWLEDGE GAIN.

AREA OF KNOWLEDGE GAIN	NO. OF RESPONDENTS	PERCENTAGE OF TOTAL
Didn't learn anything	62	44.9
That plants identified in the brochure are considered to be pests	22	15.9
Identification procedures for identifying potential pest plants	22	15.9
Garden plants have the potential to adversely affect native bush	12	8.7
Proper disposal can prevent the dispersion of pest plants	6	4.3
Plants can escape from domestic gardens	2	1.4
Other	7	5.1
Don't know/unsure	15	10.9
	(N=138)	

Note: Percentages do no total 100 due to multiple responses from respondents.

Questions unanswered

Very few individuals indicated that they had questions concerning invasive weeds which were not addressed in the brochure. Of the 138 respondents, only 11 stated that they had questions and two of these could not articulate their queries. Of the remaining 9 respondents, 5 had questions concerning other plant species, primarily whether certain types of plants were considered to be pests. The other four concerned disposal of invasive weeds and generally involved technical information, such as the correct type of weed killers and herbicides to use and the appropriate balance between all the disposal methods listed in the brochure. One individual questioned the appropriateness of taking noxious weeds to the landfill, and wanted more information on this method.

Design and content of 'Garden Escapes'

Design and content issues were examined to indicate how the brochure might be improved. Asking respondents their impressions could point out any major omissions or areas which could use further reinforcement. Figure 3 provides a summary of responses into the design and content of the brochure.

A majority of individuals were indifferent to the design and content of the brochure. This response may be because a majority of respondents made their assessment without detailed examination of the brochure. This also indicates that the method used is not an effective way of getting considered responses about the content and the design of the brochure. Future research will need to employ different methods.

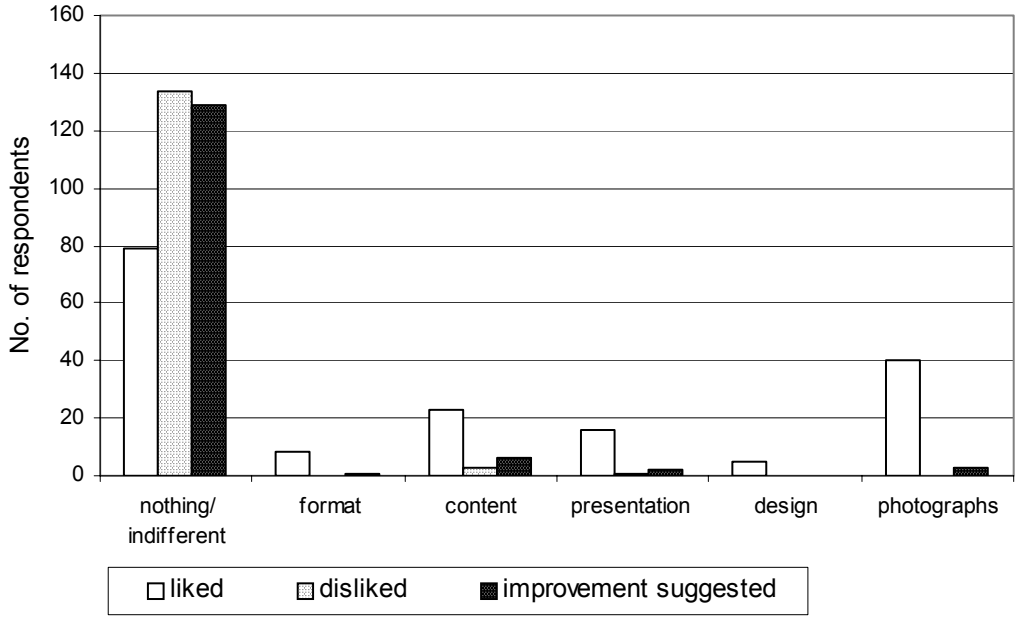

Figure 3. Design and content aspects of 'Garden Escapes'.

The aspects of the brochure which received the most favourable attention were the photographs, followed by the content. The majority of comments relating to the content concerned the provision of factual information in a way that assisted in comprehension. Inclusion of biological characteristics was also mentioned as being related to this.

Very few respondents (3) had specific criticisms of the brochure. The concerns of these people related to the content—they thought that there were not enough invasive weeds identified in the brochure, either visually or in the text. This point was reinforced in the comments concerning the possible improvements to the brochure. Of the six responses indicating that the content could be improved, five were directly related to the number of plants which featured in the brochure. Similarly, two indicated that more pictures should have been included, while one suggested close-ups of the original photographs.

4.7.2 Discussion

An important consideration in developing public awareness material is acknowledging the attributes of the intended recipients. Factors such as content, presentation, and format all have to be co-ordinated in a way that allows a majority of recipients to receive, read and understand the main message of the communication. In the absence of research into the characteristics of the intended recipients, and in attempting to reach as many individuals as possible, people developing public awareness material must make some assumptions into how to co-ordinate design and content issues. In making the recipients disclose their own critique of the brochure, the assumptions made by the Department can be assessed and areas which require improvement can be noted.

A majority of respondents had a good understanding of who produced the brochure and the main messages it contained. Most respondents were,

however, indifferent to the design and content of the brochure. This is likely to be a result of the use of inappropriate methods. Respondents had been exposed to the brochure at least 3 weeks before surveying and, as a result, had not studied the brochure for a reasonable period of time. This may have lead to them indicating that there was nothing particularly notable about the design and content of 'Garden Escapes', as they were unable to remember specific aspects of the brochure.

The area in which most respondents thought they had increased their knowledge was in the identification of invasive weeds. Our survey indicated, however, that visual identification or recognising by biological characteristics were two areas in which respondents scored particularly poorly. The overestimation by respondents of their identification abilities may be a problem as the inability to properly identify weeds may lead to them being disposed of inappropriately. The need for further education is clearly apparent.

The aspect of the brochure that was noted most favourably was the use of photographs. Most of those respondents that voiced an opinion considered photographs to be the most important feature of the brochure. This is probably because they are the most obvious and identifiable feature of the brochure and anyone making a brief assessment of it would probably focus on them. Nonetheless, the positive role of photographs was reinforced by the number of respondents who suggested that the inclusion of more photographs of invasive weeds would be a possible improvement to the brochure.

Including additional photographs needs careful consideration. The sample population had a certain level of knowledge to begin with. As the brochure is intended for the general public, increasing the visual content may prove overwhelming for less knowledgeable groups.

4.8 ADDITIONAL INFORMATION

In determining whether 'Garden Escapes' is effective in altering peoples' weed disposal behaviour, it was necessary to ascertain their current disposal practices. While only 20 individuals indicated alterations in behaviour after reading the brochure, to validate and further explain these results, the number of individuals already employing correct disposal techniques was determined. In addition to this, results of where the general population gathers their information on appropriate disposal methods were analysed. For these assessments, the results from all 402 questionnaires were compiled and examined.

4.8.1 Analysis

Current disposal methods

Table 10 summarises the current vegetation disposal methods used by respondents, the most common of which was by landfill, which was used by 66% (266) of respondents. Composting recorded the next highest response with 139 individuals. The only other categories with more than 100 responses were employing someone else to dispose of the vegetation and chemical spraying.

TABLE 10. CURRENT DISPOSAL METHODS.

DISPOSAL METHOD	NO. OF RESPONDENTS	PERCENTAGE OF TOTAL
Landfilling	266	66.2
Composting	137	34.1
Employing someone else	119	29.6
Spraying	106	26.4
Burning	74	18.4
Shredding	33	8.2
Discarding outside property	12	3.0
Burying	9	2.2
Other	17	4.2
	(N=402)	

Note: Percentages do not total 100 because of multiple responses from respondents.

A total of 161 individuals used only one method of disposal. Of the 161, 88 (55%) used landfills, 42 (26%) employed someone else to dispose of the unwanted vegetation and 16 (10%) composted. A majority of respondents (59%) employed two or more methods.

The high number of respondents stating that they use more than one method of disposal may indicate that most were aware of the need to dispose of different vegetation in different ways. As most individuals conform to at least one of the appropriate behaviours listed in the brochure, it can be suggested that the majority of those surveyed were using suitable disposal methods.

Where to go for information

Respondents were asked where they believed they could go to gain information on how to identify and dispose of invasive weeds. Table 11 provides a summary of responses.

Thirty-five percent (139) of respondents indicated that DOC would be the agency contacted for information. The local council recorded the next highest

TABLE 11. SOURCES OF INFORMATION ON IDENTIFYING AND DISPOSING OF INVASIVE WEEDS.

SOURCE	NO. OF RESPONDENTS	PERCENTAGE OF TOTAL
DOC	139	34.6
Local council	88	21.9
Gardening shops	69	17.2
Libraries	54	13.4
Unspecified council	48	11.9
Regional council	24	6.0
MfE	6	1.5
Other	76	18.9
Don't know	47	11.7
	(N=402)	

Note: Percentages do not total 100 due to multiple responses from respondents.

response with 22% (88). Only 6% (24) of respondents stated that the Regional Council would be an appropriate agency to contact. This figure may, in fact, be slightly more than 6% as 48 individuals stated that a 'council' would be a relevant source of information but a specific council was not recorded. Within the 'other' category, common responses included the Internet, local information centres, and universities.

Origin of information

A question on how knowledge of disposal techniques was acquired was included to determine where people find out about conservation issues.

Two hundred and forty-one (60%) indicated that their source of knowledge was derived from common sense. Family/friends/neighbours and garden books received the next highest response rates with approximately 150 (37%) individuals in each category. DOC listed the fifth highest score with 103 (26%) individuals. A summary of results is shown in Table 12.

TABLE 12. SOURCES OF ACQUIRED KNOWLEDGE ON DISPOSING OF PEST PLANTS.

SOURCE	NO. OF RESPONDENTS	PERCENTAGE OF TOTAL
Common sense	241	60.0
Family/friends/neighbours	150	37.3
Garden books	148	36.8
Newspapers	111	27.6
DOC	103	25.6
Regional council	99	24.6
Brochures	85	21.1
Garden shops	78	19.4
Other	46	11.4
	(N=402)	

Note: Percentages do not total 100 because of multiple responses from respondents.

The responses to this question were then re-analysed, but using only those who had acknowledged seeing and reading the brochure. This was done to determine if the brochure had any impact on individuals' perceptions of where their knowledge had been obtained. As before, common sense was the category that received the most number of responses, followed by 'garden books'. DOC displaced family/friends/neighbours and recorded the third most popular response with 50 (36%). Only 46 respondents (33%) stated that brochures were a source of information.

4.8.2 Discussion

Most respondents indicated that DOC was the appropriate agency from which to obtain information on identification and disposal of invasive weeds. The local council was identified as the next most likely place respondents would go for information, even though it does not have any direct responsibility for the control of invasive weeds. Having people contacting their council for advice,

even though they are not in the business of advising on weeds is not necessarily a problem, however. Any enquiries can easily be referred to either DOC or the Regional Council.

The Wellington Regional Council, which assisted in the production of the brochure, was only considered by a very small number as an appropriate agency. This may indicate the need for this agency to promote itself more widely.

Alternative sources of information identified by respondents included garden shops and libraries. DOC has already recognised the role of these sources and has distributed the brochure to the appropriate places. A common source recorded in the 'other' category was the Internet. As the number of people using the Internet as a source of information is increasing rapidly, it is not surprising that it was identified by respondents. The Department's website has links to information on invasive weeds that are easily identifiable. Also, the Department's website is suggested if a cursory search is conducted within certain search engines. Overall, it is evident that DOC has identified and taken the necessary actions to ensure maximum exposure of the issues involved with invasive weeds by utilising various communication mediums and locations.

A majority of respondents indicated that common sense was the main acquired source of information on disposal of unwanted vegetation. Common sense is not a meaningful source of knowledge, however, as it is influenced by a multitude of factors and experiences. Future research should not incorporate this category as an answer option.

The high number of people stating 'family/friends/ and neighbours' as a source of information suggests that the ability of 'Garden Escapes' to alter the level of knowledge of those who receive it is only indicative of the wider potential of the brochure. While it cannot be assumed that increasing knowledge will have a similar effect in increasing the level of 'common sense' an individual may report to have, the references to family/friends/neighbours present alternative avenues through which the brochure can have influence. The respondents who experienced knowledge gain as a consequence of the brochure have the potential to inform others by passing on their acquired information. This is an important consideration and should be noted in the evaluation of the effectiveness of the brochure.

5. Summary discussion

The results of the investigation into the effectiveness of 'Garden Escapes' have to be considered within the bounds of the sample surveyed. Demographic data collected indicates that the sample population was relatively uniform and thus the results can not be imposed, or represent, other populations of a different demographic nature. This homogeneity may also amplify the effects on knowledge, etc. that the brochure may have imparted. Consequently, conclusions need to be viewed within this context.

It has been established that the brochure, by itself, does not have a significant effect on recipients' level of knowledge on the issues involved in weeds invading native bush. It is only when the brochure is personally delivered or used in conjunction with a covering letter, that it is able to influence recipients levels of understanding. The mode of distribution is, therefore, very influential on the effectiveness of the brochure.

The mode of distribution also has an effect on the duration of any knowledge gain experienced. It was shown that while personal delivery was able to influence the level of knowledge over the short term, it was unable to sustain knowledge gain over a period of three months. Comparatively, when used in conjunction with a covering letter, the brochure was able to increase knowledge over both distribution periods. This may have been, in part, due to the ability of respondents to refer back to the covering letter. The positive effect on knowledge over the long term is the basis of the recommendation that the brochure/letter variable is the most effective.

Alternatively, the ability of 'Garden Escapes' to influence attitudes and perceptions is difficult to determine. All variable groups scored consistently high for each question investigating these attributes and these scores did not differ significantly from the control. The only conclusion that can be drawn is that most respondents' had appropriate attitudes and perceptions towards the issues involved with invasive weeds and that these were present before respondents were exposed to the brochure.

The brochure did have a positive effect on the behaviour of some individuals. Only a relatively small number of respondents indicated behavioural adjustments, but, placed within the context that few would engage in inappropriate disposal methods, the fact that some respondents were positively influenced warrants consideration. Family, friends, and neighbours were identified as a source of information for disposal methods, so changing the behaviour of even a small number of recipients has the potential for greater influence. It is acknowledged that the validity of some indications of behavioural change expressed by respondents is questionable, but even so, the brochure's ability to instigate changes in disposal methods and behaviour should not be discounted.

Elements of the design and content of the brochure were investigated to provide an indication of possible improvements. It was found that the photographs included in the brochure were the most popular aspect enjoyed by

respondents. Suggestions by respondents that additional photographs be included highlight the role of photographs in plant identification. Given that the brochure was not able to influence the ability of respondents to visually identify invasive weeds, the suggestion by some that additional photographs be included is interesting. However, as people are able to refer back to the printed material that they receive, the inclusion of more invasive weeds in the text and photographs may be a useful improvement to the brochure.

6. Recommendations

6.1 KEY ASPECTS TO ENSURE THE EFFECTIVENESS OF BROCHURES

The following key aspects to be considered when planning the production of a brochure are a direct consequence of the investigation into the effectiveness of the brochure 'Garden Escapes'. This brochure was designed specifically to address peoples' behaviour with respect to plants escaping domestic gardens and adversely affecting native bush. Although these recommendations can be used when developing new brochures containing conservation messages, it should be remembered that they are based solely on the investigation of this specific brochure. These recommendations address, particularly, the means by which the usefulness of this brochure could be improved.

Brochures should include, or be used in conjunction with, personalised information

To increase the potential of brochures, it is evident that information or materials need to be included which address recipients' perceptions of personal relevance. By attending to perceptions of relevance, increased attention will be paid to the actual communication which will result in improved assimilation of information by recipients. Choosing the best method of distribution is one way that this can be achieved.

Many brochures are directed at the general public, and it will often be difficult to include personalised information within them. 'Garden Escapes' provided a good example in that only the generic issue could be identified rather than the specific localised problem. Using the brochure with a covering letter enable the local issues to be highlighted and attached to the wider issue, thus providing the link between factual information and its personal relevance.

Include a comprehensive list and set of photographs of invasive weeds within, or in addition to, the covering letter

The ability of people to modify their behaviour relative to invasive weeds rests on their capacity to properly identify them. Although respondents thought that their ability to do so was improved as a consequence of receiving 'Garden Escapes'; in reality, this was not the case. It is evident that to assist in the public's ability to identify invasive weeds, more visual reference material needs

to be included in the brochure. This was also the indication given by respondents in the assessment of design and content aspects of the brochure.

The photos in 'Garden Escapes' were included to illustrate the biological characteristics of invasive weeds, rather than for direct identification purposes, so it is possible that recipients did not associate these specific plants in the photos with the issues of invasive weeds in their local area. Using additional visual information within, or in conjunction with, covering letters could provide a link between local issues and identification. Reference to DOC's website could also be made.

Given that 'Garden Escapes' already provided pictures of invasive weeds, the question of how much additional information could have been included, is relevant. Given the nature of the sample, the inclusion of additional photographs may prove overwhelming to a less knowledgeable group. The optimum amount of visual material to be included needs to researched by investigating what other people believe to be an appropriate level.

Specify the objectives/aims of brochures

The purpose of the brochure 'Garden Escapes' was to change or reaffirm appropriate behaviour, but not all brochures produced by DOC will seek to achieve this objective. Some may be produced to inform the general public and, consequently, knowledge gain will be the specific aim. Where brochures are to be used and how they fit within the wider scope of public awareness activities needs to be established well in advance of their production.

'Garden Escapes' did have some effect on recipients' level of knowledge, but to expect it to have had a profound effect on their attitudes, perceptions and behaviour may be unrealistic or inappropriate. Brochures may need to be used in co-ordination with other types of media or public awareness strategies which can attend to the more 'persuasive' aspects needed to affect appropriate attitudes etc. Brochures should not be considered the only approach in attempts to create responsible 'green citizens'. However, if they are used in co-ordination with other types of media, they can prove valuable in generating appropriate environmental behaviour.

6.2 FUTURE RESEARCH

The general public

An area of research which needs to be addressed is the effectiveness of the brochure on the general public. The homogeneity of the respondents in this investigation prevents the extrapolation of results to the wider public. A survey incorporating a more diverse sample population needs to be conducted.

To ensure that future research is indicative of the wider public, additional demographic information needs to be collected. This includes household composition, house tenure, ethnicity and income levels in addition to age, education and sex. The level of literacy of the respondent also needs to be identified. All these factors may influence reception and reading rates.

In addition, cultural information such as whether English is the predominant language used and familiarity with written communication levels should be determined.

Design and content

There are several questions relating to the design and content of the brochure that were not answered in this survey which would be useful. Identifying if the presentation and content aspects of brochures affect reception and reading rates would prove informative. Similarly, whether presentation impacts on potential knowledge gain is an important question. Investigating different types of brochures would provide a clearer picture of how effective brochures can be.

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Appendix 1

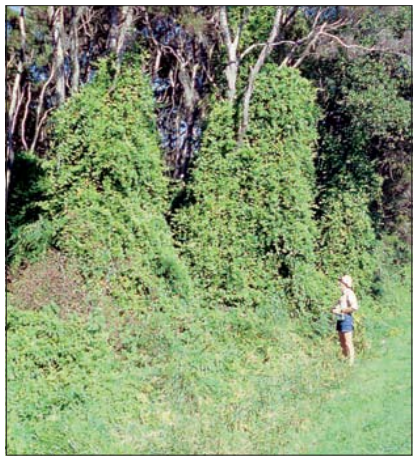
'GARDEN ESCAPES' BROCHURE

The brochure was produced as a concertina (tri-fold) single sheet. The panels of the brochure are reproduced on the following two pages.

IS YOUR GARDEN A THREAT?

Today's garden flowers can be tomorrow's weeds. Garden plants can easily escape and establish themselves in bush next door or hundreds of kilometres away, where they can overshadow and displace native plants. For example, passionfruit vines creep over walls, boxthorn berries are eaten by birds and their seeds dispersed, old man's beard seeds are distributed by wind and wandering Jew that has been dumped by gardeners sprawls over forest floors.

Many pest plants will establish from discarded root fragments, cuttings or seed-heads. Once established, these plants can quickly replace native vegetation and are often further distributed by birds, animals, wind or water movement. Weed seeds may also be carried on clothes and footwear or in loads of gravel and dispersed to new locations where they can establish new infestations. Water weeds can be spread between bodies of water on fishing equipment, boats and trailers.



Japanese honeysuckle (above), like the invasive old man's beard (right), smothers trees and can eventually cause collapse of native forest canopies. Photo: Susan Timmins

WHY ARE PEST PLANTS A PROBLEM?

Native ecosystems are in danger throughout New Zealand from pest plants. Over 240 introduced plants have become pests. They can smother our indigenous forests and prevent their regeneration; they permanently modify habitats in wetlands, coastal habitats, lowland forest, shrubland and native grasslands; and they can hybridise with closely related native species

Potato plants and other garden rejects flourishing where they were dumped in a forest clearing. Photo: John Dodson

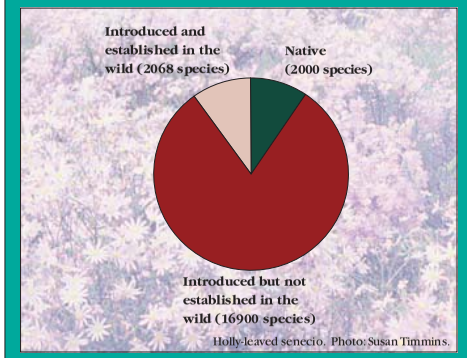
WHAT YOU CAN DO

- Learn to recognise pest plants, look out for them and remove them.
- Dispose of pest plants wisely – take your garden waste to an approved landfill or transfer station, burn it or bury it – don't dump it.
- Report to your local authority or regional council when you observe a plant that you have not seen before spreading out of control. You could prevent a serious plant pest problem.
- Find out which of your garden plants could escape into native bush. Buy garden plants that you know will not escape and become pests.

DID YOU KNOW?

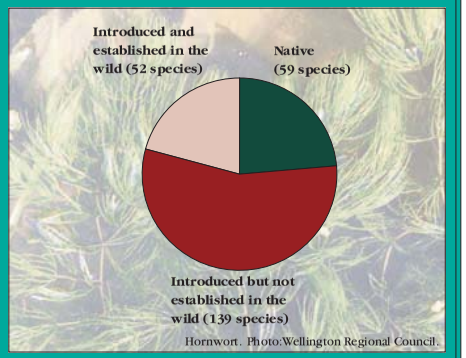
About 75 percent of land plant pests and 50 percent of freshwater weeds are garden escapes. On average, eight garden plant species each year become naturalised in the wild.

Land plants in New Zealand



Holly-leaved senecio. Photo: Susan Timmins.

Freshwater plants in New Zealand



Hornwort. Photo: Wellington Regional Council.

Pest plants threaten the survival of 61 native plant species and also threaten the long-term survival of some native animals.

Old man's beard. Photo: Jeremy Rolfe.

Discarded fragments of wandering Jew form dense carpets which prevent the growth of native seedlings. Photo: John Barkla.

MORE INFORMATION AND ADVICE

- Your regional council or local authority
- Department of Conservation conservancy and area offices

THANKS TO

- Chris Buddenhagen and Susan Timmins, Science and Research, Department of Conservation
- Lance Vervoort, Auckland Regional Council
- Wellington Regional Council, Plant Pest Division

THE REGIONAL COUNCIL
caring about you & your environment

Published by:
Department of Conservation
PO Box 5086
Wellington
August 1998

Department of Conservation
Te Papa Atawhai

How to recognise pest plants

They have persistent roots

Wild ginger reproduces from rhizomes that become detached from parent plants. Photo: Wellington Regional Council.

They produce lots of seeds

Old man's beard produces enormous quantities of seeds. Photo: Jeremy Rolfe

They have an effective dispersal mechanism

The fruit of cathedral bells explodes releasing winged seeds which are spread by wind. Photo: Wellington Regional Council.

They reproduce vegetatively

Climbing asparagus is dispersed by movement of tuberous roots in soil. Photo: Wellington Regional Council.

PEST PLANTS ALSO:

- **germinate rapidly**
- **grow quickly**

Garden Escapes

Garden Plants Invading Our Bush

Department of Conservation
Te Papa Atawhai

Appendix 2

METHODOLOGY

The approach taken in developing this methodology is based on empirical research cited in the literature review (section 2) combined with examination of appropriate surveying processes. As a result, a fully structured questionnaire was developed as the survey tool to assess knowledge, perceptions, attitudes and behaviour of people who received the 'Garden Escapes' brochure.

A2.1 Sampling

Individual households for each control and experimental group were selected using multi-stage cluster sampling. This involved dividing the sample area into sample squares (clusters) using cadastral maps, which showed the property boundaries of all households in the area. Included in these areas were zones which had been identified by Department staff as being high priorities for the release of the brochure. Clusters were then randomly selected to determine which areas were to be surveyed.

Households within each selected cluster were randomly chosen for control and experimental groups. The number of households in each cluster varied. Therefore, to ensure the probability of being selected was relatively consistent for each household, the number of households chosen for each condition was proportional to the total number of households contained within the cluster.

The brochure was distributed by one of the three methods to each of the households selected for the experimental groups. Records were kept of the addresses of these households so that the correct houses were administered the questionnaire and it was known which experimental condition they were exposed to.

Respondents from each household were selected by, first, determining how many people were at home at the time of surveying and were over 18. If there was only one person at home, they were asked to participate. If there was more than one person home, the option to complete the questionnaire was given to all, but only one questionnaire could be completed per household. This method is not consistent with random sampling methodologies and was employed to obtain as higher response rate as possible.

A2.2 Distribution methods

To determine if varying the method of distribution alters the effectiveness of the brochure, several methods were analysed. These included:

- Delivery of the brochure only into letterboxes
- Delivery of the brochure plus covering letter into letterboxes
- Personal delivery of the brochure only to the occupants of the household

The first two methods involved placement of the brochure (or the brochure plus letter) into the letterboxes of those households that had been selected for

that experimental group. Although the brochure 'Garden Escapes' is frequently used by DOC staff in conjunction with a covering letter, the brochure featured by itself as an independent variable. By investigating these two separate variables it would be possible to identify whether the brochure alone is effective and if the covering letter adds to its effectiveness.

The last variable 'personal delivery' was investigated to gauge if interpersonal contact would increase the awareness and attention the receiver directed towards the brochure. This method involved the delivery of the brochure in person, directly to the occupant of the households selected. This mode of delivery served a similar purpose to the covering letter, as the individual delivering the brochure drew the occupant's attention towards the issues raised in the brochure. It also provided the opportunity for a brief discussion to take place if the recipient had any questions at the time of delivery. As personal delivery is a method commonly used by the Department of Conservation, and requires a significant amount of time and resources, it was necessary to determine its effectiveness.

A2.3 Questionnaire

A surveyor-administered questionnaire was developed (Appendix 3). This consisted of six sections: the first four investigated the respondents' perceptions, attitudes, knowledge and behaviour relative to garden plants and the issue of their potential threat to native bush. The fifth section investigated whether the respondent had seen and read the brochure, therefore it was applicable only to those individuals which were exposed to it. The last section, dealing with demographic information, was presented to both the control and experimental groups and completion was optional.

Perceptions and attitudes

Questions in the perception section investigated the respondent's personal views about the issue of invasive weeds escaping from domestic gardens. Questions first asked the respondent if plants have the ability to escape gardens and whether these plants present a threat to native bush. It also investigated whether the respondent believed the plants in their personal garden were a potential threat to native bush, and in doing so, identified if the respondent perceived the information in the brochure as being relevant to them.

Questions in the attitude section attempted to determine the environmental position of the respondent e.g. concerned about and caring for the environment or otherwise. As it was not feasible to directly ask an individual directly if they have a positive attitude to native bush (as most would probably say yes), attitudes were explored by using hypothetical situations to indicate their values and beliefs.

The reason for the perception and attitude sections being placed at the beginning of the questionnaire was that these sections would not trigger the respondent into thinking that the basis of the survey was concerned with the brochure 'Garden Escapes'. Also, ordering the questions so the easier, less intimidating questions are at the beginning of the questionnaire reduces potential anxiety in the respondent (Stone 1993). As the respondent becomes more comfortable with the questions asked, they are more likely to reveal their

true perceptions, attitudes etc. This order also provided the opportunity for the respondent to adjust to the topic of the questionnaire.

Knowledge

The questions in this section directly assessed the participants' level of understanding of the problems of invasive weeds. This was achieved by purposefully investigating aspects and issues of invasive weeds which were specifically addressed in the contents of the brochure. Questions involved issues such as identification of invasive weeds through their biological characteristics; proper disposal methods; and why such plants are a problem. These issues were clearly the focus of 'Garden Escapes'.

One question asked respondents to visually identify specific invasive weeds which featured in the 'Garden Escapes'. Respondents were shown the same photographs as those in the brochure. Higher profile plants such as Old Man's Beard were not used, as they had been the focus of previous public awareness campaigns.

Questions in the knowledge section consisted mainly of multiple-choice answers. Each set of answers included 3 options which were consistent with the information in the brochure. Comparisons between control and experimental groups would indicate if the individuals who had received the brochure were more likely to select these three options. This in turn would reflect the effectiveness of the brochure in conveying its conservation message. Respondents were credited as answering the question correctly if two of the three options were selected.

Behaviour

The questions investigating respondent behaviour identified the methods used by respondents to dispose of their garden rubbish and where they obtained their information on why and how to do so. The purpose was to determine if individual behaviour had been altered by the information in the brochure.

Multiple-choice questions were used to examine behaviour. Unlike those contained within the questions in the knowledge section, the answer options did not include correct or incorrect answers. The purpose was to gain more information on how, and for how long, individuals had practiced certain gardening behaviours, so the options canvassed a range of disposal and gardening behaviours.

'Garden Escapes'

The section 'Garden Escapes' specifically addressed the brochure itself. Upon reaching this section of the questionnaire, the respondents were shown the brochure and then asked to complete a series of questions. Throughout the course of this section, the respondents were only allowed to briefly examine the contents of the brochure to ensure that they had correctly identified receiving it. The DOC logo was covered, as were all references to who had produced the brochure, as a question in the survey asked respondents who they thought produced the brochure.

All questions in the 'Garden Escapes' section were open-ended. It first asked the respondent if they had seen the brochure and, then, if they had read it. This

procedure was necessary as the comparison of survey results between control and experimental groups would only be valid if those individuals in the experimental groups had actually seen and read the brochure and those individuals in the control had not. It was also important to make this distinction between seeing and reading, as not all respondents would have read the brochure. The brochure's effectiveness cannot be determined by investigating those that have not read it.

Once it was determined whether respondents had seen and read the brochure, they were then asked if there were aspects of the brochure that they liked, disliked, or thought could be improved. As this section dealt primarily with the respondents' own assessment and evaluation of the brochure, any cues or leads were removed. This enabled more qualitative data to be collected, as answers were not limited to specific categories and the opportunity to give explanations was available.

Other questions asked the respondent what the main messages of the brochure were and whether they had engaged in any behavioural changes as a result of reading it. Although the answers to these queries would have been identified in previous sections, respondents were asked these questions to assess whether physically seeing the brochure at the time of surveying altered the nature of their responses.

Demographics

This section consisted of multiple-choice questions which identified the sex, age, education, and residential situation of the respondent.

It was expected that the demographic composition of the sample would be relatively homogeneous. Consequently, detailed evaluation of demographic information was not considered essential. As a result, only basic data was sought and completion of this section made optional.

A2.4 Pilot testing

Two pilot tests of 10 randomly selected households were conducted in order to refine the questionnaire. These tests were conducted to ensure that all potential faults and ambiguities in the wording of the questions were identified, and to clarify coding procedures necessary in the analysis of results.

Appendix 3

QUESTIONNAIRE

GARDENING PRACTICES

All information collected from this questionnaire is for research purposes and will remain strictly confidential and anonymous. Once the research is complete all questionnaires will be destroyed.

PERCEPTIONS

1. Garden plants are able to establish themselves outside property boundaries:

1	2	3	4	5	☐
Strongly Disagree		Neutral		Strongly Agree	Don't know/ unsure

2. If garden plants (could/can) establish themselves outside garden/property boundaries they should be considered as problem plants:

1	2	3	4	5	☐
Strongly Disagree		Neutral		Strongly Agree	Don't know/ unsure

3. In general, plants in domestic gardens/properties can invade native bush

1	2	3	4	5	☐
Strongly Disagree		Neutral		Strongly Agree	Don't know/ unsure

4. The plants in my garden/property can invade native bush

1	2	3	4	5	☐
Strongly Disagree		Neutral		Strongly Agree	Don't know/ unsure

ATTITUDES

5. I would change my gardening behaviour if it was discovered that my current practices were causing the spread of pest plants:

1	2	3	4	5	☐
Strongly Disagree		Neutral		Strongly Agree	Don't know/ unsure

6. If my favourite garden plant was identified as a pest plant I would remove it:

1	2	3	4	5	☐
Strongly Disagree		Neutral		Strongly Agree	Don't know/ unsure

7. I consider myself to be a person that engages in environmentally friendly gardening practices:

1	2	3	4	5	☐
Strongly Disagree		Neutral		Strongly Agree	Don't know/ unsure

KNOWLEDGE

8. Photo: Please identify these plants:
   A. _____
   B. _____
   C. _____

9. How would you recognise a potential pest plant? (select up to 3)
   - ❑ If it looks like a weed
   - ❑ If it grows quickly
   - ❑ If it attracts a lot of insects
   - ❑ If it has a lot of flowers
   - ❑ If it produces a lot of seeds
   - ❑ If it is hard to eradicate
   - ❑ If it has persistent roots
   - ❑ If it produces a strong smell
   - ❑ Don't know
   - ❑ Other_____

10. What are the most important reasons a plant may be viewed as a pest?(select up to 3)
   - ❑ Bad appearance
   - ❑ Require constant removal
   - ❑ Can prevent the growth of plants in the garden
   - ❑ Can attract undesirable plant/insects
   - ❑ They can smother native forests
   - ❑ They can hybridise with related native species
   - ❑ Can prevent the growth of plants outside the garden
   - ❑ Can permanently modify habitats
   - ❑ Pest plants are not a problem
   - ❑ Other_____

11. Which of the following are generally considered as pest plants? (select up to 3)
   - ❑ Japanese Honeysuckle
   - ❑ African Clubmoss
   - ❑ Wandering Jew
   - ❑ Jasmine
   - ❑ German Ivy
   - ❑ Monkey Apple
   - ❑ Climbing Asparagus
   - ❑ Mexican Daisy

12. What do you think are the best ways of disposing of pest plants? (select up to 3)
   - ❑ Compost them
   - ❑ Leave them
   - ❑ Burn them
   - ❑ Take them to an approved landfill
   - ❑ Shred them
   - ❑ Discard outside property
   - ❑ Bury them
   - ❑ Spray them
   - ❑ None of the options
   - ❑ Other_____

13. What do you think are the worst ways of disposing of pest plants? (select up to 3)
   - ❑ Compost them
   - ❑ Leave them
   - ❑ Burn them
   - ❑ Take them to an approved landfill
   - ❑ Shred them
   - ❑ Discard outside property
   - ❑ Bury them
   - ❑ Spray them
   - ❑ None of the options
   - ❑ Other_____

BEHAVIOUR

14. Where do you think you can go for information on identifying and disposing of pest plants?

15. In what ways, if any, do you normally dispose of unwanted vegetation from your garden/property? Check all that apply.
    - ❑ Compost it
    - ❑ Leave it
    - ❑ Burn it
    - ❑ Take it to a landfill
    - ❑ Shred it
    - ❑ Discard it
    - ❑ Bury it
    - ❑ Employ someone else to dispose of it
    - ❑ None of the options
    - ❑ Spray them
    - ❑ Other _____

16. Would you say your method(s) of disposal have changed in the past 2 years?
    - ❑ Yes
    - ❑ No

17. Where did you acquire your knowledge on how to dispose of unwanted vegetation? Check all that apply.
    - ❑ Family/friends/neighbours
    - ❑ Garden shops
    - ❑ Common sense
    - ❑ Regional Councils
    - ❑ Department of Conservation
    - ❑ Garden books
    - ❑ Newspapers
    - ❑ Brochures
    - ❑ Other:_____
    - ❑ All of the options
    - ❑ None/don't know

BROCHURE

18. Have you seen this brochure?
    - ❑ Yes
    - ❑ No

    If yes, where did you see it?_____
    If no, discontinue interview.

19. Have you read this brochure?
    - ❑ Yes
    - ❑ No

    If no, why not?_____
    If no, discontinue interview.

20. What is the main message(s) of the brochure?
    _____

21. Do you know who produced the brochure?
    - ❑ Yes
    - ❑ No

    If yes, who?_____

22. Did you learn anything from the brochure?
    - ❑ Yes
    - ❑ No

    If yes, what?_____

23. Do you have any questions about pest plant species that are not answered in the brochure?

❑ Yes ❑ No

If yes, what?_____

24. Has your behaviour in choosing and disposing of garden plants changed at all after reading the brochure?

❑ Yes ❑ No

If yes, how?_____

25. What aspects of the brochure did you like?

26. What aspects of the brochure did you dislike?

27. How do you think the brochure could be improved?

DEMOGRAPHICS (optional)

28. Sex

❑ Male ❑ Female

29. Age

❑ under 20 ❑ 40-49 ❑ 70 over
❑ 20-29 ❑ 50-59
❑ 30-39 ❑ 60-69

30. Education

❑ Some secondary (completed 5th or 6th form) ❑ Some tertiary
❑ Tertiary (completed degree or diploma)
❑ Secondary (completed 7th form) ❑ Other_____

31. Tenancy/residential situation.

❑ Rent ❑ Own ❑ Board ❑ Other

Appendix 4

PARTICIPANTS INFORMATION SHEET

Study: An investigation into knowledge and behaviour relative to pest plants in domestic gardens.

Researcher: Anthony Fraser, B.Sc. Masters of Environmental Studies student. School of Earth Sciences, Victoria University of Wellington.

Funding agency: Department of Conservation

This information sheet is to provide you with an understanding of the purpose of this investigation and what your participation will include if you are willing to be involved. Please read this form carefully and if you have any questions or require clarification on any of the points raised, please ask the researcher present.

The purpose of this research is to determine the general understanding of invasive weed species in domestic gardens. As you are located in an area where there are many gardens, your input into this investigation would be very helpful.

Your participation in this study is completely voluntary. If you agree to participate, you may withdraw at any time, or you may refuse to answer any question. In the case that you do not complete the entire questionnaire, you will be asked whether your comments to that point may be used in the study. The time taken to complete the questionnaire is approximately 5-8 minutes.

Confidentiality will be strictly maintained during and after the research study. All questionnaires and their origins will be stored in a secure file cabinet located in my office at Victoria University. Analysis and presentation of results will be conducted using aggregates of all the questionnaires so that no individual questionnaire will be the subject of such analysis. Once analysis is complete all questionnaires will be destroyed.

By completing the questionnaire you thereby consent to participate in this study.

If you have any further questions about this study you may get in touch with the supervisor of the thesis listed below.

Dr Laurie Jackson
School of Earth Sciences
Victoria University of Wellington
PO Box 600, Wellington
Phone: (4) 463-5461
E-mail: laurie.jackson@vuw.ac.nz

Appendix 5

COVERING LETTER

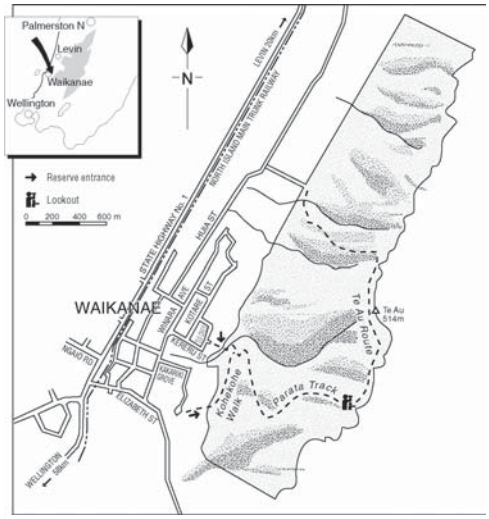
Department of Conservation
Te Papa Atawhai

Dear Resident

WEED CONTROL IN HEMI MATENGA SCENIC RESERVE

This is to advise you of the Department's intention to control weeds within the area.

The benefits of weed control will be to contain or eradicate weeds that threaten one of the largest remaining areas of Kohekohe forest.



Key invasive weeds that threaten the reserve include:

- Old Mans Beard
- Banana Passionfruit
- Japanese Honeysuckle
- Wild Ginger
- Climbing Asparagus
- Wandering Jew

Control of these weeds is the responsibility of the landowner.

Dumping of garden refuse in Hemi Matenga Memorial Park Scenic reserve is one of the main sources by which new weed infestations occur. Even lawn clippings can contain suckers and seeds. Please note that dumping garden refuse inside the reserve is an offence under the Reserves Act, 1997.

Weed identification pamphlets and appropriate treatment advice is available at Kapiti Area Office, Department of Conservation, Waikanae or Wellington Regional Council, Tel. (04) 384-5708.

Your support for this programme will be appreciated.

Yours faithfully

Colin Giddy
Conservation Officer, Threats
For Area Manager