

SCUBA DIVING & UNDERWATER CULTURAL RESOURCES: DIFFERENCES IN ENVIRONMENTAL BELIEFS, ASCRIPTIONS OF RESPONSIBILITY, AND MANAGEMENT PREFERENCES BASED ON LEVEL OF DEVELOPMENT¹

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Abstract: This study examined SCUBA divers' level of development in relationship to environmental beliefs, ascriptions of responsibility, and management preferences concerning the use and management of New York's Great Lakes' underwater cultural resources. More than 850 New York State divers were surveyed during the fall of 1999, ranging from novices to experts and post-experts. Particular emphasis was placed on measuring extent of agreement with statements that focused on the use and preservation of underwater artifacts, which implicitly involved issues related to accessibility of abandoned shipwrecks. Although divers of all levels of development did tend to share certain beliefs, ascriptions of responsibility, and management preferences, the strength of agreement with half of the statements did differ by level of development. The predicted pattern of increasing in strength from beginner to expert and declining again for post-expert stages was supported in nine cases, while post-experts continued a more direct linear relationship with three items. In these particular cases, a "history effect" may have had an influence on post-expert divers. The results of this study documented the need for continuing support to educate divers on safe and responsible use of underwater resources.

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Introduction

Tourism professionals, community developers, and SCUBA divers are concerned with the protection and use of underwater cultural resources in New York's Great Lakes, an area encompassing the two lakes bordering the state (Ontario and Erie) as well as the two rivers that feed into them (the Niagara and St. Lawrence). Increased interest in SCUBA diving in this area has been attributed to two recent factors.

First, water clarity has significantly increased within the last ten years, due not only to pollution control programs, but also to zebra mussel infestations. This overpopulated exotic species is predominantly known for its negative environmental impacts: disturbing the natural balance of the Great Lakes' ecosystem as well as clogging drainage pipes to and from water, electrical, and industrial plants (Hogan, 1996). However, by filter feeding on phytoplankton and zooplankton, this dominating pest has dramatically increased the water clarity of murky waters, a positive effect appreciated by SCUBA divers (Hogan, 1996). Instead of seeing only a few feet under the water's surface (as was the case prior to 1988, the year the first zebra mussel appeared in the Great Lakes), divers can now see 20 to 60 feet (Zeidner, 1996).

Second, the passage of the 1987 Abandoned Shipwreck Act (ASA) has led to greater interest in shipwreck diving and artifact finding. Due to its vast cultural resources, the Great Lakes region is considered by many to be the best cold water diving location in the United States; in fact, the region has a reputation of offering the best shipwreck diving in the world, with vessels dating back to the Revolutionary War (brochure, no author).

Importantly, the ASA shifted ownership of underwater shipwrecks from the federal government to each individual state in which they are found. New York allows and even encourages exploration, but divers are prohibited from taking and even touching artifacts that are found under the surface. When a diver removes an item from its original setting the value, integrity, and significance are lost because the whole picture and its surroundings are missing. According to researchers, historians, and state agencies, however, removal of items from under the surface is a noticeable problem because the act is so hard to enforce (Zeidner, 1996).

Because SCUBA diving is gaining in popularity, the potential to affect not only underwater cultural resources, but also marine resources and fragile ecosystems, is high (Davis & Tisdell, 1996; Fabbri, 1990). The underwater environment is delicate and can become unbalanced and threatened more easily than realized. However, as most studies incorporating Dunlap & Van Liere's (1978) "New Environmental Paradigm" scale have shown, those who participate in outdoor recreation and are members of environmental organizations tend to have positive attitudes toward the environment. Possessing pro-environmental attitudes, however, has not been shown to automatically lead to environmentally responsible behaviors. Only

recently have several studies demonstrated fairly strong support for the relationship between outdoor recreation participation and pro-environmental behaviors (Nord, Luloff, & Bridger, 1998; Theodori, Luloff, & Willits, 1998; Tarrant & Green, 1999; Theodori & Luloff, 1999).

Water recreationists are generally less aware than land-based outdoor recreation participants of the negative effects they may cause the marine environment, because a change in water quality may happen over a period of time with less indication of the direct cause (Wall & Wright, 1977). Of particular note, inexperienced divers tend to contribute more to environmental damage than skilled divers because of their inability to control buoyancy under the surface. A direct result of this lack of control is stirring up silt clouds that suffocate and kill organisms, as well as touching, bumping, and crashing into shipwrecks, reefs, and other ecologically and culturally significant resources (Davis & Tisdell, 1995). In order to minimize effects on the environment, Graver (1999) suggests diving should be a "no contact" activity. Although SCUBA diving is a self-regulated industry, participation does require certification. Many certification agencies include environmental awareness in their courses, but because certification does not expire, being kept informed of how not to negatively affect the environment may not occur (Davis & Tisdell, 1995).

As the above discussion demonstrates, factors such as skill level, experience, and knowledge seem to be directly related to divers' level of development. In the literature two prominent leisure theories, amateur/professionalism and specialization, form the basis for studying the growth, progress, and development of participants in leisure activities.

Perhaps best known for proposing a progression of commitment, Stebbins (1979, 1992) studied "serious leisure" and amateurism in art, entertainment, science, and sport. According to his theory, as an activity becomes more important to participants, they progress from dabblers to novices, amateur participants, or amateur devotees, or may even become paid professionals. In describing participants' career histories, however, Stebbins also described a stage of decline or post-professionalism. Scanlan, Ravizza & Stein (1989) demonstrated many of Stebbins' concepts in their study of elite figure skaters by documenting five phases of development (with the final two characterized as retirement from competitive skating, and staying involved past retirement through coaching or show performing), based on skaters' evolving commitment, achievement, and involvement. In her study of quiltmakers, Todd (1998) also documented a progression and retrogression of development. Data from 459 quiltmakers (including 24 inactive quiltmakers) showed that level of quilting development was related to measures of equipment, knowledge, experience level, perceived skill, participation, and commitment; mean scores for each of these factors increased from beginners through experts and then declined for post-experts.

On the other hand, Bryan (1977) defined specialization as "a continuum of behavior from the general to the particular, reflected by equipment and skills ... and activity preferences" (p. 175). Degree of specialization was defined as a function of one's time, money, equipment, skill, and psychic commitment to an activity. In his study of fly fishermen, as specialization increased, Bryan found that attitudes and values about the activity changed, affected in part by the prominence of a leisure social world. Bryan suggested that the activity was linked to the properties of the resource in which the sport was practiced, with the specialist wanting to be able to control and manipulate the resource setting in such a way that skill and luck could be differentiated.

In addition, Bryan (1977, 1979) found that more experienced anglers developed a preservationist focus where nature and the setting were more important than actually catching fish, versus the consumptive point of view found in less developed anglers. Similarly, when Katz (1981) evaluated the relationship between environmental attitudes and specialization of fly fishermen, he found that concern for the environment increased as specialization increased. Kauffman (1984) reinforced this notion in his study of canoeists; environmental attitudes toward the resource base increased as level of specialization increased, and were strongest for highly specialized canoeists. However, it is important to note that none of these studies accounted for what eventually happens to specialists once their levels of development begin to decline, i.e., the existence of a post-professional or post-expert phase.

Purpose of the Study

This study therefore examined SCUBA divers' level of development in relationship to their environmental beliefs, ascriptions of responsibility, and management preferences concerning the use and management of New York's Great Lakes underwater environment. It was hypothesized that divers with higher levels of development (i.e., beginners through experts) would have stronger beliefs about the use of underwater cultural resources. It was also expected that divers with higher levels of development would tend to take more responsibility for their actions and prefer management actions that place more responsibility on divers to police themselves rather than encourage the use of invasive, controlling management actions. In each case, it was further hypothesized that post-expert divers would decrease in the strength of their responses when compared to experts.

This study could establish the extent to which theories of specialization and amateur/professionalism may be applied to SCUBA divers. By documenting a progression of novice through post-expert divers, the applicability and generalizability of the models could be significantly expanded. As Somers (1988) writes,

SCUBA diving is often referred to as a "recreational sport." However, the term "sport" sometimes implies erroneous connotations and

limits understanding. SCUBA diving can be an avocation or a vocation. It is a pastime, a pursuit, or even a lifestyle, that can be as limited or extensive as one makes it. A person's level of commitment, degree of skill, and types of equipment all depend on what he/she wants out of SCUBA diving. (On-line abstract)

This study could also document the need for continuing support to educate divers on safe and responsible use of underwater resources so that they learn to preserve as well as appreciate them. Without users' environmental awareness and the implementation of environmentally responsible management practices to help sustain the underwater environment, the very resource that SCUBA diving depends on may disappear and become unavailable for future use.

Methods

Two methods of data collection were used: focus group interviews and a mail survey. First, during the month of June 1999, six focus group interviews were conducted in five key locations across the New York Great Lakes Region: Buffalo/Niagara Falls, Rochester, Syracuse, Oswego, and Clayton (2 groups). For each meeting, a key informant helped organize 4 to 12 divers representing a wide range of diving levels. Using an established protocol, the primary investigator asked a series of 6 questions; each tape-recorded meeting lasted approximately 90 minutes. Major themes of discussion were then gleaned from the focus group data to aid in the development of a 16-page written questionnaire.

The second method of data collection involved mailing 2850 surveys to a sample of active and inactive New York State divers. A database of approximately 6700 individuals was compiled from various resources, including a national certifying agency, a statewide organization, a dive symposium, a dive shop, a non-profit organization, and several dive clubs.² In order to select a sample of 2850 divers, addresses were stratified by major regions across the state. Primary emphasis was placed on contacting divers in the regions closest to the Great Lakes, with subsequently less emphasis placed the farther away one resided. Consequently, those selected to receive the survey included all available names from some regions and a random selection from other regions. A total of 2850 surveys was then mailed during October 1999, followed by reminder postcards and a second mailing of the survey to non-respondents.

For purposes of this study, respondents were asked to rate a total of 18 statements concerning the use and management of the underwater environment on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Statements were worded to reflect beliefs (9 statements), ascriptions of responsibility (3), and management preferences (6). Particular emphasis was placed on measuring extent of agreement with statements that focused on the use and preservation of underwater artifacts, as well as issues of accessibility to abandoned shipwrecks. Respondents were also asked to rate the extent to which 6 specific management actions would affect their diving experiences if they were to encounter them while diving in New York's Great Lakes region. Choices on a 7-point scale ranged from -3 (negatively) to +3 (positively) with 0 representing no effect.

Level of development was operationalized by a self-selected single measure, where respondents were asked to characterize their current stage of development as a diver by choosing one of the following five categories: beginner, intermediate, advanced, expert, or "post-expert - not the expert I once was."

One-way analysis of variance was used to determine if a difference existed among mean scores for each statement (worded as a belief, ascription of responsibility, management preference, or effect of management action) by level of development. To compare the differences between mean scores for each pair of developmental levels, Scheffé's was used as a post hoc test if the F-value was significant ($p < .05$).

² Cooperation was received from the following organizations: Professional Association of Diving Instructors (PADI); New York State Divers Association (NYSDA); Great Lakes Underwater III Symposium; Syracuse's National Aquatic Service, Inc.; Bateaux Below, Inc.; Rochester's Rec Divers club; Buffalo Aqua Club; Syracuse University's dive club; and Central New York Dive Club.

Table 1. Environmental Statements with a Majority of Respondents Agreeing

Item	Mean	% who disagreed	% who were neutral	% who agreed	n
If I take an artifact and so does every one else, nothing will be left for anyone to see.	4.2	8.1	9.1	82.8	804
Compared to 10 years ago, the underwater visibility in NY's Great lakes is better.	4.1	2.9	32.0	65.1	771
There should be stiff fines for divers who take valuable historical artifacts.	4.0	11.3	14.1	74.6	799
Compared to 10 years ago, I am more environmentally conscious and sensitive to environmental issues than I used to be.	3.9	10.2	20.7	69.1	797
Information about shipwreck locations should be made easily accessible to the public.	3.8	7.7	22.7	69.5	801
Directly contacting objects on abandoned shipwrecks causes them to deteriorate.	3.7	10.1	28.0	61.9	801

Table 2. Environmental Statements with a Majority of Respondents Disagreeing

Item	Mean	% who disagreed	% who were neutral	% who agreed	n
Zebra mussels should be removed from the surfaces of shipwrecks so I can see them better.	2.4	55.0	34.1	11.0	797
If I don't take an artifact as a souvenir, someone else will.	2.3	61.9	21.8	16.2	801

Table 3. Environmental Statements with a Majority of Respondents Remaining Neutral

Item	Mean	% who disagreed	% who were neutral	% who agreed	n
Canada does a better job of protecting and regulating shipwreck diving than the U.S.	3.5	3.3	59.6	37.1	767
There is government support of the diving industry in Canada.	3.4	2.4	65.8	31.8	757
There is government support of the diving industry in NY's Great Lakes.	2.6	31.7	61.6	6.7	757

Table 4. Environmental Statements with No Majority Captured by Any Response Category

Item	Mean	% who disagreed	% who were neutral	% who agreed	n
Access to abandoned shipwrecks should be unrestricted.	3.3	30.6	22.7	46.7	801
Artifacts should be collected and displayed in museums for the general public to view.	3.2	24.7	32.8	42.6	799
Fifty years is a reasonable time period to use when dating whether objects are of significant archaeological interest.	3.1	22.2	47.4	30.3	784
Diving on shipwrecks should be monitored by authorized diving guides.	3.0	35.1	27.6	37.2	803
Touching objects is okay unless they are historically significant or fragile.	2.8	41.9	23.2	34.9	794
The bubbles I blow while diving can have an impact on the underwater environment.	2.6	46.4	28.6	15.0	796
It is okay to recover objects that have sunk to the bottom and will disappear anyway.	2.6	46.0	29.1	24.9	800

Results

Although 2850 surveys were originally mailed, 490 (17 percent) were returned either as undeliverable or noted as having been sent to non-divers. (While an unusable rate of 10 percent is common for studies of this nature, the higher undeliverable rate for the current study was not unexpected. One focus of the overall project was to uncover why divers cease participating; thus, some of the addresses used were up to 10 years old, increasing the chance of incorrect addresses.) Of the remaining 2360 potential respondents, 869 usable questionnaires were returned, yielding a 37 percent response rate.

Four out of five respondents were male. While ages ranged from 12 to 80, the average age reported was 43. Half of the respondents had earned 2- or 4-year college degrees, while another quarter had received advanced degrees. Half reported earning more than \$60,000 in household income per year.

Due to the relatively low response rate, a non-respondent bias check was conducted by phone. Non-respondents did not differ significantly from respondents when age, gender, education level, number of years spent diving, or stage of development were compared. However, significantly lower percentages of non-respondents were certified or active divers. Thus, when interpreting results, it is important to remember that diving was likely to have been more salient for respondents than non-respondents.

When rating a total of 18 statements concerning environmental beliefs, ascriptions of responsibility, and management preferences on a 5-point agreement scale, a majority of respondents tended to agree with the six statements shown in Table 1. These statements generally reflected a pro-environmental attitude and awareness of the consequences of disturbing underwater artifacts. A majority of respondents tended to disagree with only two statements: "Zebra mussels should be removed from the surfaces of shipwrecks so I can see them better," and "If I don't take an artifact as a souvenir, someone else will." (See Table 2.) Interestingly, a majority of respondents tended to be neutral towards three items: "Canada does a better job of protecting and regulating shipwreck diving than the U.S.," "There is government support of the diving industry in Canada," and "There is government support of the diving industry in NY's Great Lakes." (See Table 3.) Those who were not neutral, however, were much more likely to feel that Canada does a better job than the U.S. of supporting the dive industry and protecting underwater resources. Responses for the remaining seven statements were more evenly distributed among respondents, with no clear majority agreeing, disagreeing, or being neutral. (See Table 4.)

Respondents were also asked to rate the extent to which six specific management actions would affect their diving experiences if they were to encounter them while diving in New York's Great Lakes region. Choices on a 7-point

scale ranged from -3 (negatively) to +3 (positively) with 0 representing no effect. Approximately 75 percent of all respondents answered that three items would positively affect their experience, with means ranging from +1.4 to +1.5: additional artificial reefs, more intentionally sunk ships, and underwater parks and trails. About half of all respondents felt that two items (interpretive signs [e.g., on shipwrecks, etc.], and collection and display of artifacts in an accessible underwater location for the general public to view) would positively affect their experience, but mean scores were just +0.7. Finally, respondents felt negatively more often than positively (44 vs. 32 percent) about underwater protection of artifacts (e.g., roping them off, chaining them down, putting them under plastic domes). Consequently, the mean score for that item was slightly negative (-.3).

Of the 847 respondents who selected a category to represent level of development, 198 (23 percent) marked "beginner," 267 (32 percent) were "intermediate," and 250 (30 percent) considered themselves to be "advanced." However, less than 10 percent (77 respondents) rated themselves as "expert," and only 6 percent (55

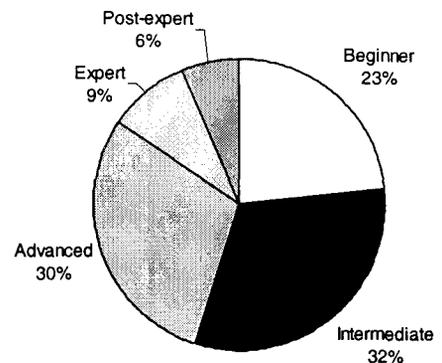


Figure 1. Level of Development

respondents) called themselves "post-expert - not the expert I once was." (See Figure 1.)

As with quiltmakers (Todd, 1998), these categories were found to adequately reflect dive-related factors of equipment owned, knowledge, experience, perceived skill, participation, and commitment, plus an additional scale measuring amateur/professional growth (Todd, 2000). For six of the scales, mean scores increased from beginner to expert and then decreased for post-experts. Experience was the only scale that displayed a different pattern: instead of declining at the post-expert stage, experience level continued to increase, due to its cumulative nature. Figure 2 highlights how post-expert scores tended to return to a level equal to those of advanced divers for six of the seven indices.

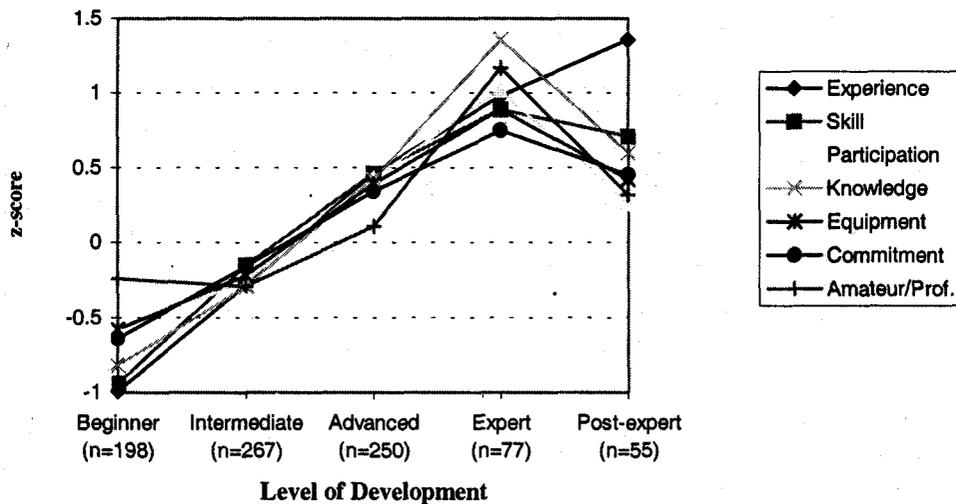


Figure 2. Factors Related to Level of Development

It was hypothesized that divers with higher levels of development (i.e., beginners through experts) would have stronger beliefs toward the use of underwater cultural resources, but the strength of these responses would decrease for post-expert divers. It was also expected that divers with higher levels of development would tend to take more responsibility for their actions and prefer management actions that place more responsibility on divers to police themselves rather than encourage the use of invasive, controlling management actions; a decrease was again expected for post-expert divers. As shown in Table 5, partial support was found for these relationships. One-way analysis of variance yielded significant differences among the mean scores of half of the 24 items based on level of development ($p < .01$): 10 of the 18 environmental statements and 2 of the 6 effects on experience quality statements.

As displayed in Figures 3 and 4, several distinct patterns emerged. First, the predicted pattern of responses increasing in strength from beginner to expert and decreasing again for post-experts was demonstrated in two ways: a progression of *agreeing* more strongly, or a progression of *disagreeing* more strongly. However, although all mean post-expert scores tended to decrease in strength when compared to experts in each of these cases, it is important to note that the decline was statistically significant for only one item: the belief that there is government support of the diving industry in New York's Great Lakes. Interestingly, experts significantly *disagreed* more strongly with this belief when compared with any other level of development. On the other hand, experts tended to *agree* most highly with a total of 8 items: the 4 beliefs that underwater visibility is better than 10 years ago, Canada protects and regulates shipwreck diving better than the U.S., the Canadian government supports the diving industry, and touching objects is okay unless they are significant or fragile; and 4 management-related variables: information on shipwreck locations should be accessible, access to abandoned shipwrecks should be unrestricted, plus additional artificial reefs and more intentionally sunk ships would enhance their diving experiences.

For the second set of patterns, instead of post-experts decreasing in the strength of their responses when compared to experts, they followed a more direct linear relationship with several items: the belief that it is acceptable to recover objects that have sunk to the bottom and will disappear anyway; and the management preference statements that there should be stiff fines for taking artifacts, and that diving on shipwrecks should be monitored by authorized diving guides. As hypothesized, divers in the beginning stages of development responded more heavy-handedly, indicating significantly more support for invasive management practices (such as fines for taking artifacts and authorized diving guides for shipwreck diving). Beginner divers were also the least likely to believe that it is acceptable to touch or recover objects.

On the other hand, there were no significant differences between diver development levels for the remaining 12 items, including all 3 ascriptions of responsibility. Specifically, all divers tended to *agree* with 3 statements: the beliefs that they were more environmentally conscious and sensitive than they had been 10 years ago, and that directly contacting objects on abandoned shipwrecks causes them to deteriorate; and the ascription of responsibility that taking artifacts will leave nothing for anyone else to see. Regardless of developmental level, all divers tended to *disagree* with the following 3 statements: the ascriptions of responsibility that their bubbles impact the underwater environment and that if they don't take an artifact someone else will; and the management preference for removing zebra mussels from shipwreck surfaces. Finally, all divers tended to be more *neutral* towards 2 statements: the belief that 50 years is a reasonable time period for dating significant artifacts, and the management preference for collecting and displaying artifacts in museums. When rating effects on experience quality, all divers felt slightly positive about encountering underwater parks and trails, interpretive signs, and displaying collected artifacts in an accessible underwater location, but were slightly negative towards noticeably invasive underwater protection of artifacts.

Table 5. Environmental Statements: One-way Analysis of Variance Using Mean Scores of Divers with Different Levels of Development

Statement	Total (n=847)	Level of Development					F	p	# of Differences Detected
		Beginner (n=198)	Intermediate (n=267)	Advanced (n=250)	Expert (n=77)	Post-expert (n=55)			
Beliefs:									
Compared to 10 years ago, the underwater visibility in NY's Great Lakes is better.	4.05	3.56 ^a	3.89 ^b	4.27 ^c	4.68 ^d	4.44 ^{cd}	30.00	.01	8
Compared to 10 years ago, I'm more environmentally conscious and sensitive to environmental issues	3.87	3.81	3.77	3.93	4.07	3.93	1.60	.17	n.s.
Directly contacting objects on abandoned shipwrecks causes them to deteriorate.	3.75	3.76	3.79	3.73	3.79	3.56	0.64	.63	n.s.
Canada does a better job of protecting and regulating shipwreck diving than the U.S.	3.55	3.14 ^a	3.36 ^{ac}	3.78 ^b	4.17 ^{bd}	3.73 ^{bc}	28.41	.01	6
There's government support of the diving industry in Canada	3.42	3.15 ^a	3.25 ^a	3.60 ^b	3.86 ^b	3.62 ^b	19.68	.01	6
Fifty years is a reasonable time period to use when dating whether objects are of significant archaeological interest.	3.05	3.09	3.05	3.06	3.12	2.85	0.74	.57	n.s.
Touching objects is okay unless they are historically significant or fragile.	2.83	2.59 ^a	2.75 ^a	2.86 ^{ab}	3.26 ^b	3.13 ^{ab}	5.10	.01	2
It is okay to recover objects that have sunk to the bottom and will disappear anyway.	2.60	2.32 ^a	2.58 ^{ab}	2.64 ^{ab}	2.88 ^b	3.06 ^b	5.60	.01	2
There is government support of the diving industry in NY's Great Lakes.	2.63	2.92 ^a	2.74 ^{ac}	2.52 ^{bc}	2.07 ^d	2.50 ^c	17.79	.01	6
Ascriptions of Responsibility:									
If I take an artifact and so does every one else, nothing will be left for anyone to see.	4.23	4.24	4.22	4.26	4.32	3.96	1.11	.35	n.s.
The bubbles I blow while diving can have an impact on the underwater environment.	2.66	2.84	2.62	2.59	2.54	2.75	1.41	.23	n.s.
If I don't take an artifact as a souvenir, someone else will.	2.25	2.15	2.26	2.20	2.33	2.65	2.15	.07	n.s.
Management Preferences:									
There should be stift fines for divers who take valuable historical artifacts.	4.05	4.20 ^a	4.09 ^a	4.08 ^a	3.84 ^{ab}	3.55 ^b	4.19	.01	3
Information about shipwreck locations should be made easily accessible to the public.	3.83	3.70 ^a	3.75 ^a	3.92 ^{ab}	4.13 ^b	3.87 ^{ab}	3.96	.01	2
Access to abandoned shipwrecks should be unrestricted.	3.28	2.92 ^a	3.14 ^{ac}	3.49 ^b	3.71 ^b	3.52 ^{bc}	9.71	.01	5
Artifacts should be collected and displayed in museums for the general public to view.	3.23	3.22	3.22	3.16	3.31	3.53	1.26	.29	n.s.
Diving on shipwrecks should be monitored by authorized diving guides.	2.98	3.45 ^a	3.06 ^b	2.72 ^c	2.68 ^{bc}	2.67 ^{bc}	12.31	.01	5
Zebra mussels should be removed from the surfaces of shipwrecks so I can see them better.	2.35	2.45	2.36	2.32	2.29	2.21	0.79	.53	n.s.

Means with different superscripts are significantly different at the .05 level. Values are mean scores on a 5-point scale ranging from strongly disagree (1) to strongly agree (5).

Table 6. Effects on Experience Quality: One-way Analysis of Variance Using Mean Scores of Divers with Different Levels of Development

Statement	Total (n=847)	Level of Development					F	p	# of Differences Detected
		Beginner (n=198)	Inter- mediate (n=267)	Advanced (n=250)	Expert (n=77)	Post- expert (n=55)			
<i>Effects on Experience Quality:</i>									
Additional artificial reefs	+ 0.54	+ 1.17^a	+ 1.42^{ac}	+ 1.87^b	+ 1.89^{bc}	+ 1.25^{abc}	8.35	.01	3
More intentionally sunk ships	+ 0.43	+ 0.85^a	+ 1.18^a	+ 1.88^b	+ 2.08^b	+ 1.52^{ab}	15.35	.01	4
Underwater parks and trails	+ 0.40	+ 1.31	+ 1.35	+ 1.60	+ 1.41	+ 0.98	2.07	.08	n.s.
Interpretive signs (e.g., on shipwrecks)	+ 0.69	+ 0.66	+ 0.65	+ 0.77	+ 0.91	+ 0.30	1.07	.37	n.s.
Collection and display of artifacts in an accessible underwater location for the general public to view	+ 0.67	+ 0.56	+ 0.58	+ 0.73	+ 0.96	+ 0.80	1.03	.39	n.s.
Underwater protection of artifacts (e.g., roping them off, chaining them down, putting them under plastic domes)	- 0.33	- 0.14	- 0.37	- 0.39	- 0.25	- 0.62	0.84	.50	n.s.

Means with different superscripts are significantly different at the .05 level. Values are mean scores on a 7-point scale ranging from negatively (-3) to positively (+3) with 0 representing no effect.

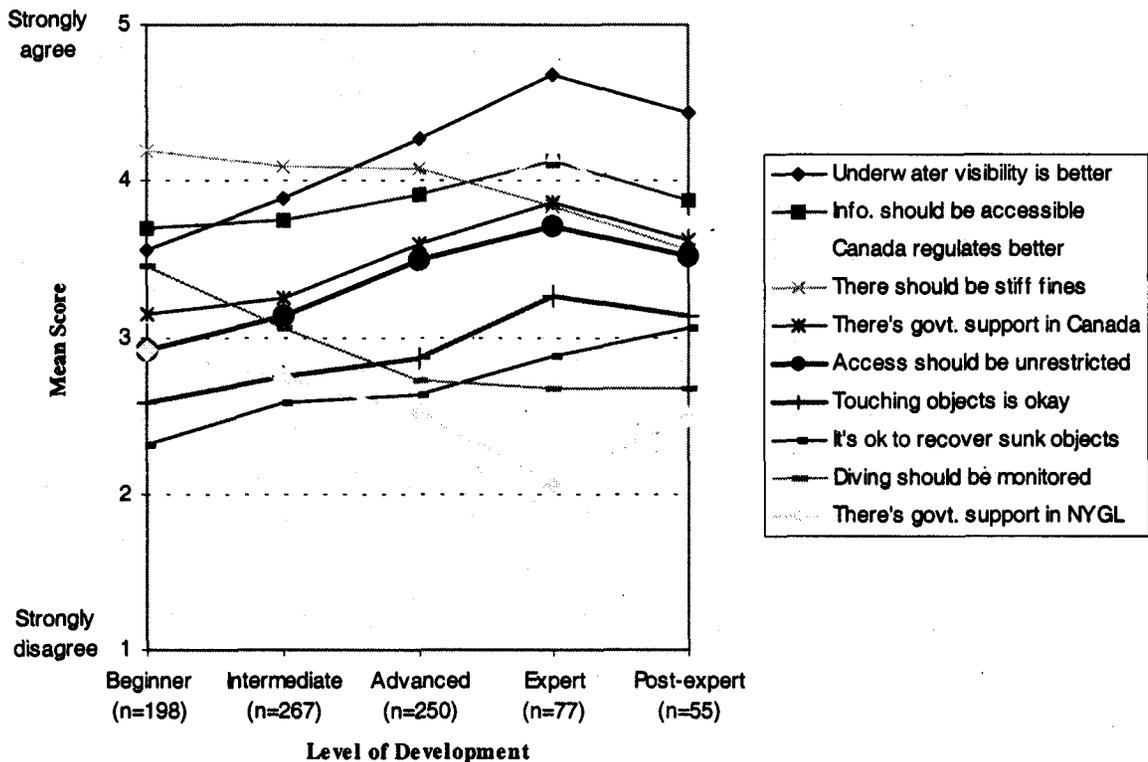


Figure 3. Environmental Statements by Level of Development

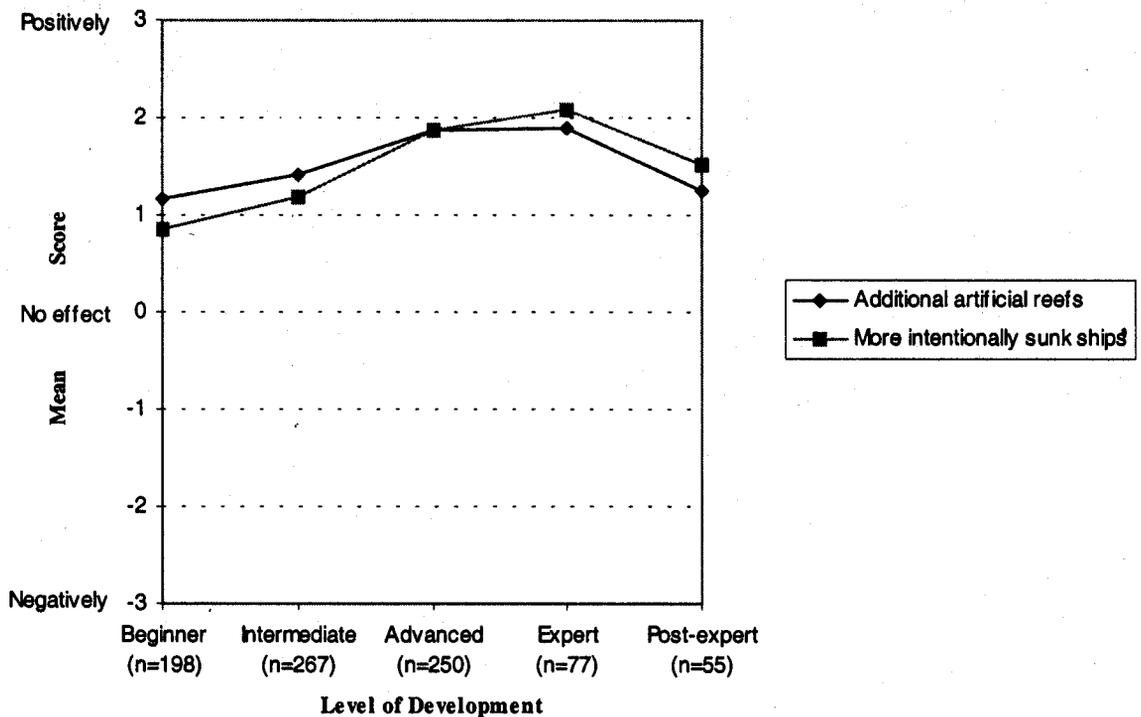


Figure 4. Effects on Experience Quality by Level of Development

Conclusions and Implications

Based upon the findings, divers of all levels of development do tend to share certain beliefs, ascriptions of responsibility, and management preferences. For instance, all divers tended to agree that they are more environmentally conscious and sensitive than they were 10 years ago, they all tended to disagree that the bubbles they blow have an impact on the underwater environment, and they all tended to be neutral on whether artifacts should be put in museums.

However, some beliefs about the use of underwater cultural resources are related to level of diving development, with a tendency to increase in strength from beginner to expert and decrease again in strength for post-experts. Of particular note, disillusion with and/or distrust of the U.S. government (especially versus the Canadian government) seems to be most evident for divers at the expert level.

In addition, some ascriptions of responsibility and management preferences also appear to be related to level of development. Divers with higher levels of development tend to take progressively more responsibility for their actions and prefer the least invasive management actions. The pattern, however, tends to vary for the post-expert phase.

As previously mentioned, beginners displayed more "purist" attitudes, i.e., were more "heavy-handed" by supporting invasive practices of fines and authorized guides, and disagreeing that it is acceptable to recover or touch objects. Perhaps beginners' lack of experience is causing them to perceive these as hypothetical situations, whereas divers with higher levels of development have actually encountered these circumstances, and, having faced reality, subsequently relaxed their purist perceptions based on true feelings.

Looking at it from a different angle, divers in the later stages of development tended to feel most strongly about being able to collect artifacts unimpaired. This seemingly "anti-environmental" response may be due in part to a history effect. Significantly, 50 percent of all experts and post-experts (specifically, more than one-third of all experts, and exactly two-thirds of all post-experts) had been diving more than 20 years (compared to just 10 percent of all beginner, intermediate and advanced divers combined.) When a large portion of these experts and post-experts started diving, artifact collecting was a major focus that was deemed highly acceptable by the dive community. Thus, their resistance to embracing and adopting the change in diving ethics may be well founded in the length of their diving histories.

Being aware of the environment and abiding by established regulations are important considerations in order for divers

to help preserve the marine environment. Divers should be role models for preservation, and proactively educate others to preserve the marine environment as well.

Not only is it essential for recreational divers to think in this manner, but these attitudes also play a key role for management agencies, instructors, clubs, and retailers. Divers often rely on charter boat operators, SCUBA diving clubs, and gear shops for current information and are influenced by their attitudes and practices when it comes to environmental issues. Divers who are involved in the community and work with organizations that advocate for the preservation of the environment benefit the dive industry the most. Management agencies need to implement management plans like Marine Protected Areas (MPAs), which use interpretive tools to educate divers and prevent the destruction of the underwater resource (Davis & Tisdell, 1995, 1996; Vereka & Ponneleit, 1981). Well designed interpretive programs can benefit the dive community by recommending dive locations, assisting with site selections, and creating an understanding of the marine and cultural environment while helping to preserve the resource (Graver, 1999; Vereka & Ponneleit, 1981).

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