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EFFECT OF CONDITION OF BIRTH ON THE TRAINING AND
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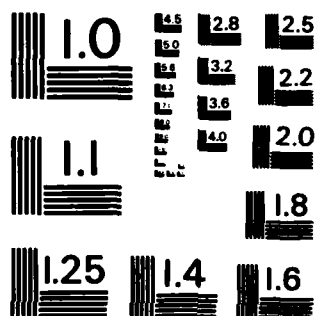
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Final Report

EFFECT OF CONDITION OF BIRTH ON THE TRAINING AND CONTROL OF CALIFORNIA SEA LIONS

Comparison of Animals Born in Captivity and in the Wild

Bill L. Scronce

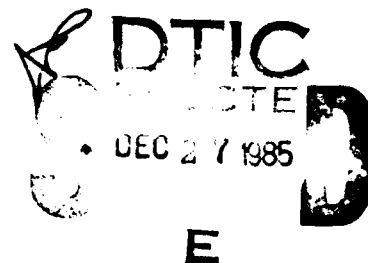
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ADMINISTRATIVE INFORMATION

The work reported upon here was conducted by the Naval Ocean Systems Center as part of the Advanced Marine Biological Systems Program, sponsored by the Naval Sea Systems Command.

Work on the comparison of California sea lions born in captivity and in the wild was done in two phases. The first was a comprehensive training phase which took place at NOSC facilities in San Diego from December 1979 through September 1980. The second phase took place from 1981 to 1984 and dealt with the animals in Fleet systems being trained to do underwater recovery tasks.

Acknowledgment and thanks are hereby given to John Grier and Kathy Krieger of SEACO, Inc., who did the training and data collection during the first 10 months of this study.

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19 ABSTRACT (Continue on reverse if necessary and identify by block number) Six California sea lions (<i>Zalophus californianus</i>) — three born in captivity and three in the wild — were compared during training for an underwater recovery task. The objective of this study was to determine the effect, if any, condition of birth had on health, growth, trainability, control, and behavior maintenance. The results indicated that there was no difference between the two groups in growth or health. On the other hand, the group born in captivity required 64% more training time, were less reliable to work, and were more difficult to handle. There were control problems with all the animals in the study. The three sea lions born in the wild were better subjects for training and were more reliable to work than the three sea lions born in captivity.					
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CONTENTS

INTRODUCTION . . . 1

MATERIALS AND METHODS . . . 1

Animals Evaluated . . . 1
Behaviors Conditioned . . . 2
Data Collected . . . 2

FINDINGS . . . 5

Health . . . 5
Growth . . . 5
Trainability . . . 6
Behavior Maintenance . . . 6

CURRENT STATUS OF SEA LIONS . . . 7

DISCUSSION . . . 7

CONCLUSIONS . . . 8

RECOMMENDATIONS . . . 8

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Good rapport between trainer and sea lion is essential in training process.

INTRODUCTION

The use and control of a variety of pinnipeds in an open water environment was reported by Evans and Harmon* and Conboy**. These animals were used in various experiments, including the recovery of objects from the ocean floor.

Quick Find, a Navy-approved system that uses California sea lions (*Zalophus californianus*) to recover acoustically active objects underwater, has been very successful in the Fleet. However, the recovery team has experienced some animal control problems during the past few years. While working untethered in open water, some animals were lost and not recovered; others have remained at large for up to two weeks before they could be located and returned to captivity. In some cases these problems may be related to the animal's age and sexual maturity or to the fact that the animal was in the wild several years before it was captured and selected for the system. If the latter were the case, some of the control problems could be eliminated simply by selecting and training animals born in captivity. It is generally believed by some experienced sea lion experts that animals born in captivity are better training subjects than animals born in the wild.

The objective of this study was to determine what effect, if any, being born in captivity or in the wild has on the health, growth, trainability, control, and behavior maintenance of sea lions used in a Navy marine mammal recovery system.

MATERIALS AND METHODS

ANIMALS EVALUATED

Six California sea lions were selected for evaluation (Table 1). Three animals were born in captivity and three had been stranded on the shore and had been in captivity for six months or longer. Five of the animals were male and one was female. The age range was 2-3 years at the start of the experiment. All six animals were in good health and eating well.

Table 1. Sea lion data.

Animal Designator*	Sex	Born (year)	Weight on 12/79 (kg)	Length on 12/79 (cm)
604-C	M	1978	34.0	125.5
625-C	M	1976	64.0	159.5
626-C	M	1977	54.0	143.5
629-W	M	1978	38.0	113.0
630-W	F	1978	35.5	128.0
631-W	M	1977	45.0	139.0

*C = born in captivity
W = born in wild

*W. E. Evans and S. R. Harmon. "Experimenting with Trained Pinnipeds in the Open Sea," in *Behavior and Physiology of Pinnipeds*, pp. 196-208. Appleton-Century-Crofts, N.Y., 1968.

**M. E. Conboy. *Project Quick Find, A Marine Mammal System for Object Recovery*. San Diego, Calif., Naval Ocean Systems Center, NUC TP 268, 1971.

BEHAVIORS CONDITIONED

Operant conditioning techniques were used to train a series of behaviors that helped establish control over the animals and also taught them to perform the task of attaching a line to an object underwater as reported in Conboy, *op. cit.* These behaviors are divided into three categories: basic, system, and open water.

Basic

The basic behaviors were separate, stand, harness, cage, and recall (Fig. 1). These are primarily control behaviors. When conditioned to perform these behaviors, the animal can be removed from a pen that houses two or more sea lions and will position itself on a stand so that the trainer can put on the harness. The animal will also follow on a leash, enter and remain in a cage, and swim to touch a device (9-kHz pinger) after a recall signal is given.

System

In this phase, the animals were trained to accept and carry a bite plate in their mouth in water, and to touch a pingered target. Next the animals were conditioned to swim with a training device and attach it to a target. They were also trained to work out of a rubber boat (Fig. 2).

Open Water

In this category the system behaviors were exercised in the open water down to a depth of 10 meters. The animals walked on a leash to the rubber boat and rode in the boat to the target area (Fig. 3). They entered the water on visual command, accepted the recovery device alongside the boat, and attached the device to the target underwater (Fig. 4).

During this phase the animals were also released from tether in open water and recalled to the boat from distances of 10-100 meters.

DATA COLLECTED

Data were collected on animal health, growth, trainability, and behavior maintenance. Health data were recorded as the number of training days lost for each animal. Growth was measured by weighing the animal monthly and measuring its length at the beginning and end of the experiment. Daily food intake and performance records were maintained.

A criterion was established for each behavior. The time a trainer spent with each animal on a specific behavior in each session was recorded by another person. There were two trainers and six animals. Each animal was trained by a different trainer on alternate days. Animal trainability data were collected from the very beginning until each animal reached criterion on each of the behaviors.

The amount of training time required to maintain each of the conditioned behaviors after the animal reached criterion was also recorded. This behavior maintenance time is a factor in the overall reliability of each animal.



(A) Separate.



(B) Stand.



(C) Harness.



(D) Cage.

Figure 1. Basic behaviors.



Figure 2. Sea lion is signaled to leave rubber boat.



Figure 3. Sea lion rides work boat to target area.

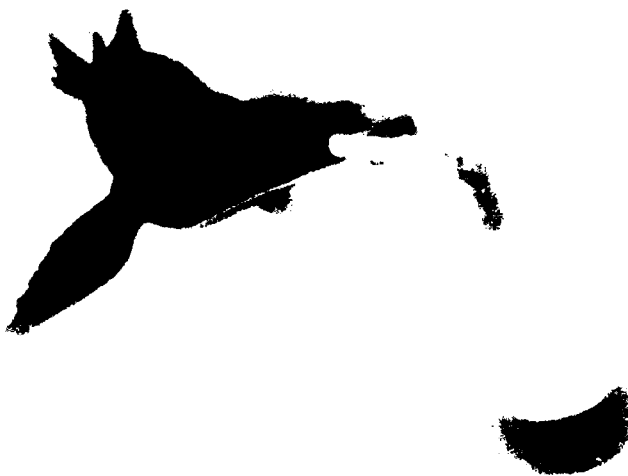


Figure 4. Sea lion attaches a recovery device to a target underwater.

FINDINGS

HEALTH

There were 16 animal-training days lost due to health problems during the experiment. In the captive-born group, animal 604-C was not trained for nine days and animal 625-C lost one training day. Six training days were lost in the wild-born group. Animal 630-W lost four days and animal 631-W lost two days due to health problems.

GROWTH

Weight, length, and food-intake data for the six animals are presented in Table 2. All the sea lions gained weight (6–32 kg) on an average daily food intake of 10% of body weight. Their growth in length averaged 1.43 cm/month (0.8–2.0 cm/month).

Table 2. Growth record.

Animal Designator	Weight (kg)		Length (cm)		Daily Food Intake (kg)	Daily Food Intake as a Percentage of Average Body Weight
	12/79	9/80	12/79	9/80		
604-C	34	50	126	146	4.1 ± 0.8	9.8
625-C	64	96	160	168	7.8 ± 1.3	9.8
626-C	54	63	144	163	5.7 ± 1.1	9.7
629-W	38	49	128	143	4.4 ± 0.5	10.0
630-W	36	42	128	140	4.1 ± 0.5	10.5
631-W	45	51	139	151	5.2 ± 1.5	10.8

TRAINABILITY

The time required to train each of the basic behaviors to criterion is shown in Table 3. The captive-born group required 64% more time to condition than the wild-born group.

Table 3. Training time to criterion.

Time given in minutes.

Behavior	Animal Designators					
	604-C	625-C	626-C	629-W	630-W	631-W
Separate	22.5	16.0	17.6	38.8	12.3	13.5
Stand	44.9	108.1	204.3	105.6	407.8	69.8
Harness	98.0	233.3	732.4	209.1	189.4	73.5
Cage	51.1	721.5	87.2	14.2	35.9	47.8
Recall	45.0	80.5	41.1	156.7	91.1	61.8

BEHAVIOR MAINTENANCE

Table 4 shows the average training time in seconds/day to maintain the basic behaviors. The time required to maintain harnessing was significantly greater (mean, 258; standard error, 10; versus mean, 179; standard error, 20) for the captive-born group.

Table 4. Behavior maintenance.

Average training time (sec) per day (50 training days).

Animal Designator	Behaviors				
	Separate	Stand	Cage	Harness	Walk
604-C	27	167	59	269	112
625-C	22	142	53	267	295
626-C	28	171	38	238	229
629-W	16	144	39	200	227
630-W	33	201	41	199	161
631-W	35	325	35	139	152

CURRENT STATUS OF SEA LIONS

During the long-term evaluation of these animals (from 1981 to 1984), five of the six were part of a working system, three in Project Quick Find and two in Hawaii. The sixth animal (625-C) died in 1980. Animal 630-W went AWOL from Project Quick Find in 1981. Table 5 is a summary of the status of the animals as of 1984.

Table 5. Status of sea lions, 1984.

Animal Designator	Sex	Weight (kg)	Daily Ration (kg)	Status	Remarks
604-C	M	75	5.9	Hawaii	Marking Project
625-C	M	—	—	Died	1980
626-C	M	67	9.5	San Diego	Project Quick Find
629-W	M	82	5.9	Hawaii	Marking Project
630-W	F	—	—	AWOL	From Project Quick Find, 1981
631-W	M	73	6.4	San Diego	Project Quick Find

DISCUSSION

There have been no major health problems with the four sea lions remaining in the study. They have grown to an average weight of 81.8 kg (range 77.3–87.3 kg) in 1984. This is an average weight gain of 9.6 kg per year for the group.

Two of the sea lion evaluation animals (one captive-born and one wild-born) are in the Fleet system Project Quick Find. Both are currently making 4 to 6 dives daily to 195 meters and attaching a line to a simulator for a recovery task. Their performance, as measured by successful attachments, is 80% or better. Animal 631-W is very calm under

most circumstances. The disposition of 626-C is notably poor when he fails to complete the task and does not get rewarded.

The other pair of sea lions in the study (one captive-born and one wild-born) are with a marking project in Hawaii. Their tasks require them to make 10 to 30 dives per daily session to a depth of 46 meters. Animal 629-W is reliable and does the tasks correctly (85-90%). Animal 604-C works well (90%) for 2 to 3 weeks and is then inconsistent (60%) for approximately one week. This animal is also unsocial (fights) when placed in the community pool.

Most of the sea lions in this study removed themselves from the training situation for periods of time by swimming away. These instances do not seem related to their condition of birth but are a response rather to the activity or the environment the sea lions are in at the moment. None of these animals were permanently lost and all of them returned to a boat or pen and were back at work after a period of time. Nevertheless, the control problem still exists; a closer look must be taken at behavior maintenance and food management as possible sources of the problem. The option of culling those animals that do not adapt to free-swimming, open-ocean work and replacing them with other animals must be available.

The comparison between the animals born in captivity and those born in the wild yielded the following results:

Health	No significant difference.
Growth	No significant difference.
Training.	Captive-born group took 64% more time to train.
Behavior Maintenance	Captive-born group required more time to maintain harnessing behavior.
Working in a System	Wild-born group was more reliable to work and was easier to handle and to keep with other sea lions.
Control	Most of the sea lions under study swam away at one time or another during training.

CONCLUSIONS

1. Data from the first 10 months of training indicate that the three sea lions born in the wild are better for training than the three born in captivity. Observations made of the same animals in working groups for a four-year period after basic training agree with those data.
2. Control of sea lions is not directly related to whether they are born in captivity or in the wild.

RECOMMENDATIONS

1. The results of this limited study appear to contradict the assumption made by some sea lion experts that captive-born sea lions are better training subjects than wild-born sea lions. There is a need for further confirmation with a large sample study.
2. The problem of animal control in a training and working situation always exists. To better determine the causes of this problem requires more in-depth analysis, including an examination of the animal's training and environmental history.

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