

# UC San Diego

## Research Final Reports

### **Title**

Sizing fish with an acoustic system

### **Permalink**

<https://escholarship.org/uc/item/9kq8h0mw>

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### **Publication Date**

2009-06-11

### **Supplemental Material**

<https://escholarship.org/uc/item/9kq8h0mw#supplemental>

**California Sea Grant Sea Grant  
Final Project Progress Report**

05/14/2009

Preparer Information  
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R/OE-40  
03/01/2007-03/01/2009  
Sizing fish with an acoustic system

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**Project Hypotheses**

Observation of acoustic scatter from fish at multiple views can be used to estimate their size and orientation in situ.

**Project Goals and Objectives**

To record acoustic scatter at multiple views from live fish in a laboratory setting, develop signal processing algorithms to estimate fish size, orientation, and taxa, and to evaluate the robustness of the algorithms on data from live animals.

**Briefly describe project methodology**

A multiple-angle scattering apparatus was developed and tested in our acoustics laboratory at SIO. Fish specimens were collected locally and insonified by the acoustic system under and IACUC approved sedation and euthanasia protocol. Data from these specimens were used to evaluate the algorithms.

**Describe progress and accomplishments toward meeting goals and objectives**

All laboratory experiments have been completed. Analysis of laboratory data has demonstrated that the multi-views can improve estimates of fish length, taxa, and orientation over single-view methods. This improvement has been quantified for size-based classification to be greater than 70% in most cases.

**Project modifications**

All laboratory experiments have been completed. Preliminary analysis has demonstrated that the multi-views can improve estimates of fish length, taxa, and orientation.

**Project outcomes**

A new multi-view scattering apparatus has been developed. Multi-view scattering data (likely the first of its kind) were collected from over 30 individual fish spanning 10 different species. Each specimen was euthanized and preserved for future comparative study.

**Impacts of project**

This project has contributed to both fisheries and zooplankton acoustic studies through the development of new methods for estimating bio-physical properties, and collecting new acoustic scattering data.

**Benefits, commercialization and application of project results**

None given

**Economic benefits generated by discovery**

None given

**Issue-based forecast capabilities**

None given

**Publications****Conference papers, proceedings, symposia**

Title: Multi-view sizing and classification of individual fish

Authors: Roberts, P.L.D. and Jaffe, J.S.

Date: 03/04/2009

Conference Title: 30th Acoustical Imaging Symposium

Location: Monterey, CA

Title: Application of multiple angle acoustic scatter to remote classification of fish

Authors: Roberts, P.L.D. and Jaffe, J.S.

Date: June 2008

Conference Title: Acoustics 08

Location: Paris, France

Title: Remote classification of fish species using multi-view acoustic scatter

Authors: Roberts, P.L.D. and Jaffe, J.S.

Date: June 2008

Conference Title: ICES Symposium on the Ecosystem Approach with Fisheries Acoustics and Complementary Technologies

Location: Bergen, Norway

**Peer-reviewed journal articles or book chapters**

Title: Classification of live, untethered zooplankton from observation of multiple angle acoustic scatter

Authors: Roberts, P.L.D. and Jaffe, J.S.

Date: To appear Aug. 2008

Journal Name: Journal of the Acoustical Society of America

Issue/Page Numbers:

Title: Multiple angle acoustic classification of zooplankton

Authors: Roberts, P.L.D. and Jaffe, J. S.

Date: April 2007

Journal Name: Journal of the Acoustical Society of America

Issue/Page Numbers: (121) pp. 2060-2070

Maps, charts, atlases charts, atlases

**Theses, dissertations**

Title: Multi-view, Broadband, Acoustic Classification of Marine Animals  
Authors: Roberts, P.L.D.  
Schools: Univ of Calif. San Diego  
Date: 06/01/2009

**Media**

*SIO Explorations*  
City: La Jolla  
State: California  
Date of publication/broadcast: March 2007  
Headline or topic: Positive ID  
Available at: [http://explorations.ucsd.edu/Research\\_Highlights/2007/Mar/Roberts/](http://explorations.ucsd.edu/Research_Highlights/2007/Mar/Roberts/)

**Students**

Paul L.D. Roberts  
Univ. of Calif San Diego  
Department: Electrical and Computer Engineering (Applied Ocean Sciences)  
Degree program enrolled in: Ph.D.  
Theses/dissertation title: Multi-view, Broadband, Acoustic Classification of Marine Animals  
Supported by Sea Grant funds?  yes  no  
Start date: 03/01/2006  
End date: 03/01/2009

**Cooperating organizations**

None listed

**Awards**

1<sup>st</sup> place: Student Poster Award at Acoustics 08, Paris, France, June 2008.  
1<sup>st</sup> place: Student Paper award at 152nd Annual meeting of the Acoustical Society of America, Honolulu HI, Nov-Dec 2006.

**Keywords**

ocean engineering, bioacoustics, fisheries acoustics