

EXHIBIT WDCWA-201

Resume of Dr. Charles H. Hanson

Education

Ph.D. Ecology and Fisheries Biology, University of California, Davis, 1980

M.S. Fisheries Biology, University of Washington, 1973

B.S. Fisheries Biology, University of Washington, 1972

Certification

Certified Fisheries Biologist

American Fisheries Society

Experience

Dr. Hanson has more than 31 years of experience in freshwater, estuarine, and marine biological studies. Dr. Hanson has contributed to the study design, analysis, and interpretation of fisheries, stream habitat, and stream flow (hydraulic) data used to develop habitat restoration strategies, Habitat Conservation Plans, Endangered Species Act consultations, and environmental analyses. Dr. Hanson has conducted evaluations of the effectiveness of various water diversion fish screening systems, assisted in fish screen design and permitting, and developed operational modifications to reduce organism losses while maintaining operational reliability of the water projects and hydroelectric systems. He has directed numerous investigations and environmental impact analyses for projects sited in freshwater, estuarine, and marine environments of the San Francisco Bay/Delta, the central and northern California Coast, Puget Sound, Hudson River, and Chesapeake Bay. Dr. Hanson has participated as an expert witness on fisheries and water quality issues in numerous public hearings and superior court litigation. Dr. Hanson has been extensively involved in incidental take monitoring and investigations of endangered species, development of recovery plans, consultations, listing decisions and identification of critical habitat, and preparation of aquatic Habitat Conservation Plans. Dr. Hanson served as a member of the USFWS Native Delta Fish Recovery Team, Central Valley Technical Recovery Team, 2007 USFWS Delta Smelt Recovery Team, numerous technical advisory committees, and as science advisor to settlement negotiations. Dr. Hanson has directed studies on the effects of selenium on waterbird reproduction and designed compensation wetland habitat. Dr. Hanson has also participated in the development of adaptive management programs including real-time monitoring, management of power plant cooling water and other diversion operations, and the San Joaquin River Vernalis Adaptive Management Plan (VAMP). Dr. Hanson has authored more than 75 technical and scientific reports.⁹

1991-Present *Senior Biologist/Principal, Hanson Environmental, Inc.*

Provides services in the design, execution, and interpretation of biological monitoring, fishery sampling, and regulatory compliance programs. Prepares technical compliance reports and exhibits for submittal to regulatory agencies, public hearings, and litigation. Presents findings to the public and press and presents expert witness testimony in litigation and regulatory hearings. Develops the design, implementation, and performance monitoring of habitat enhancement and mitigation projects to benefit fish and wildlife.

1982-1991 *Senior Biologist, Vice President, TENERA, L.P*

Provided services related to the collection, analysis, and interpretation of biological and engineering data, of findings to the public and press, and presentation of expert testimony in regulatory hearings.

1978-1982 *Senior Scientist, Ecological Analysts, Inc.*

Responsible for the collection, analysis, and interpretation of data on the abundance, distribution, and dynamics of various fisheries and invertebrate populations for use in evaluating the impact of power plant operations on aquatic populations for more than ten coastal and estuarine power plant sites in California. Prepared various regulatory environmental exhibits, technical reports, and generic and site-specific analyses of biological and engineering information for the applicability of alternative cooling water intake technologies.

1975-1978 *Research Assistant, University of California, Davis*

Conducted extensive investigations into behaviorally selected and energetically optimal swimming speeds of juvenile fish in relationship to selected microhabitats to help in establishing a database and methodology for determining instream flow criteria. Conducted laboratory studies on the swimming performance and behavioral responses of fish to hydraulic gradients to develop biological design criteria for water intake systems.¹⁰

1973-1975 *Research Scientist, The Johns Hopkins University*

Conducted fishery and zooplankton surveys in freshwater and marine environments along the Atlantic coast. Evaluated the acute and chronic effects of exposure to elevated water temperatures on freshwater and marine fish and invertebrates. Developed onsite and mobile bioassay laboratory facilities.

1969-1973 *Research Assistant, University of Washington*

Conducted bioassays to determine the synergism between elevated water temperature and duration of exposure on the toxicity of chlorine to two species of salmon. Determined the effectiveness of various techniques, including use of chlorine and thermal shock treatment in minimizing colonization by marine fouling organisms. Evaluated the acute and chronic effects of exposure to elevated water temperature on freshwater and marine fish and invertebrates. Participated in the evaluation of the behavioral attraction and avoidance of response of juvenile fish to thermal and chemical gradients.

Professional Associations

American Fisheries Society (Life Member)

American Institute of Fisheries Research Biologists (past Program Committee Chairman)

Pacific Fisheries Biologists (past Program Chairman)

Who's Who in the West

San Francisco Bay and Estuarine Society (past President)

Technical Advisory Committees

State Water Resources Control Board Striped Bass Workshop

American River Technical Advisory Committee

Mokelumne River Technical Advisory Committee11

Charles H. Hanson

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Santa Ynez River Technical Advisory Committee

Bay-Delta Oversight Committee (BDOC) Aquatic Resources

USFWS Delta Native Fish Recovery Team

CVPIA Striped Bass Technical Team

Publications:

- Davies, R.M., **C.H. Hanson**, and L.D. Jensen. 1976. Entrainment of zooplankton into a mid-Atlantic power plant - delayed and sublethal effects in Thermal Ecology II (G.W. Esch and R.W. McFarlane, eds.), pp. 349-357. U.S. Energy Res. and Develop. Admin., Report No. CONF-750425.
- Davis, D.E., **C.H. Hanson**, R.B. Hansen. 2007. Constructed Wetland Habitat for American Avocet and Black-necked Stilt Foraging and Nesting. *Journal of Wildlife Management*. In publication.
- Hanson, C.H. and C.P. Walton. 1990. Potential effects of dredging on early life stages of striped bass (*Morone saxatilis*) in the San Francisco Bay area: An Overview. Pages 39-57 In Effects of Dredging on anadromous Pacific coast fishes. Wash. Sea Grant.
- Hanson, C.H. and E. Jacobsen. 1985. Orientation of juvenile Chinook salmon and bluegill to low water velocities under high and low light levels. *California Fish and Game* 71(2):110-113.
- Hanson, C.H. and H.W. Li. 1983. Behavioral response of juvenile Chinook salmon (*Oncorhynchus tshawytscha*) to trash rack bar spacing. *California Fish and Game* 69(1):18-22.
- Hanson, C.H., J.R. White, and H.W. Li. 1977. An alternative approach for developing intake velocity design criteria. *Trans. Calif.-Nev. Wildl. Soc.*:10-18.
- Hanson, C.H., J.R. White, and H.W. Li. 1977. Entrapment and impingement of fish by power plant cooling-water intakes: an overview. *Mar. Fish. Rev.* 39(10):7-17.
- Hanson, C.H. 1976. Commentary - ethics in the business of science. *Ecology* 57(4):627-628.
- Hanson, C.H. and J. Bell. 1976. Subtidal and intertidal marine fouling on artificial substrata in northern Puget Sound, Washington. *NOAA Fish. Bull.* 74(2):377-385.12

Hanson, C.H., J. Coil, B. Keller, J. Johnson, J. Taplin, and J. Monroe. 2004. Assessment and Evaluation of the Effects of Sand Mining on Aquatic Habitat and Fishery Populations of Central San Francisco Bay and the Sacramento-San Joaquin Estuary. Prepared for Hanson Aggregates Mid-Pacific, Inc., RMC Pacific Materials, Inc., and Jerico Products/Morris Tug and Barge. Final Report. September 2004.

Lindley, S.T., C. R. Schick, E. Mora, P.B. Adams, J. J. Anderson, S. Greene, **C. Hanson**, B. May, D. McEwan, R. B. MacFarlane, C. Swanson, and J. G. Williams. Framework for Assessing Viability of Threatened and Endangered Chinook Salmon and Steelhead in the Sacramento-San Joaquin Basin. *San Francisco Estuary and Watershed Science*. Vol. 5, Issue 1 (February 2007). Article 4. <http://repositories.cdlib.org/jmie/sfews/vol5/iss1/art4/>.

Stober, Q.J. and **C.H. Hanson**. 1974. Toxicity of chlorine and heat to pink and Chinook salmon. *Trans. Am. Fish. Soc.* 103(3):569-577.

Stober, Q.J., **C.H. Hanson**, and P.B. Swierkowski. 1974. Sea water filtration and fouling control in a model rapid-sand filter for exclusion of fish from power plant cooling systems, in *Proceedings, Second Workshop on Entrainment and Intake Screening. Cooling Water Studies for Electric Power Research Institute (RP-49)* (L.D. Jensen, ed.) pp. 317-334. Rept. No. 15. Dept. of Geography and Environmental Eng., Johns Hopkins University, Baltimore.

Tanji, K., D. Davis, **C. Hanson**, A. Toto, R. Higashi, and A. Amrhein. Evaporation ponds as a drainwater disposal management option. *Irrigation and Drainage Systems*. Vol. 16, No. 4 (November 2002). Pages 279-295.

Dr. Hanson has also authored more than 75 technical and scientific reports.13