ES-97/218

December 22, 1997

Stuart Piken, P.E.
Chief, Planning Division
New York District, U.S. Army Corps of Engineers
Jacob K. Javits Federal Building
New York, New York 10278-0090

Dear Mr. Piken:

The U.S. Fish and Wildlife Service (Service) has reviewed the project plans for channel deepening activities proposed by the New York District, U.S. Army Corps of Engineers (Corps) for the Kill Van Kull / Newark Bay Navigation Channels and Arthur Kill / Howland Hook Navigation Channels projects, New York and New Jersey. Your June 23, 1997 request for formal consultation regarding potential impacts to the federally listed endangered peregrine falcon (*Falco peregrinus*) from the proposed channel deepening activities was received on June 27, 1997. This document represents the Service's biological opinion on the effects of the proposed channel deepening activities for the aforementioned projects on the peregrine falcon and is in accordance with Section 7 of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq*.) (ESA). No specific dredged material disposal sites were identified within the Corps project plans; therefore, this biological opinion does not address potential impacts to federally listed species from the disposal of project-generated dredged material. Further consultation pursuant to Section 7 of the ESA will be required if disposal sites for project-generated dredged material are identified within the vicinity of documented occurrences of federally listed species.

If you have any questions or concerns regarding this consultation, please contact Annette Scherer of my staff.

Sincerely,

Clifford G. Day
Supervisor

Enclosure

cc: NJFO (10)
GARD, North/ES
GARD, Central/RW
NYFO: Clough

NJFO:ES:AScherer:ams:ka 12/12/97

BIOLOGICAL OPINION ON THE EFFECTS OF CHANNEL DEEPENING ACTIVITIES WITHIN THE ARTHUR KILL, KILL VAN KULL, AND NEWARK BAY CHANNELS, NEW YORK AND NEW JERSEY, ON THE PEREGRINE FALCON

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

Prepared for:

U.S. Army Corps of Engineers
New York District
New York, New York 10278

December 1997

BIOLOGICAL OPINION ON THE EFFECTS OF CHANNEL DEEPENING ACTIVITIES WITHIN THE ARTHUR KILL, KILL VAN KULL, AND NEWARK BAY CHANNELS, NEW YORK AND NEW JERSEY, ON THE PEREGRINE FALCON

Prepared for:

U.S. Army Corps of Engineers
New York District
New York, New York 10278

Prepared by:

U.S. Fish and Wildlife Service
New Jersey Field Office
Ecological Services
Pleasantville, New Jersey 08232

Preparers:

Annette M. Scherer (Coordinator)
Catherine Zeeman, Ph.D.
Peter M. Benjamin

Assistant Project Leaders:

John C. Staples
Robert A. Frakes, Ph.D.

Project Leader: Clifford G. Day

December 1997

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

This document represents the Service's biological opinion on the effects of channel deepening activities proposed by the New York District, U.S. Army Corps of Engineers (Corps) within the Arthur Kill, Kill Van Kull, and Newark Bay channels, New York and New Jersey, on the peregrine falcon (*Falco peregrinus*) in accordance with Section 7 of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq*.) (ESA). This biological opinion addresses two separate, but adjacent, dredging projects proposed by the Corps: the Kill Van Kull and Newark Bay Navigation Channels project and the Arthur Kill / Howland Hook Navigation Channel project. Due to the similarity and proximity of the two projects, the Service and the Corps agreed that the projects should be addressed collectively for the purpose of determining project-related impacts to the peregrine falcon. No specific dredged material disposal sites were identified within the Corps project plans; therefore, this biological opinion does not address potential impacts to federally listed species from the disposal of project-generated dredged material. Further consultation pursuant to Section 7 of the ESA will be required if disposal sites for project-generated dredged material are identified within the vicinity of documented occurrences of federally listed species.

This biological opinion is based on information provided within the Corps' *Limited Reevaluation Study, Deepening of the Arthur Kill / Howland Hook Navigation Channel* (1996), *Draft Environmental Assessment, Kill Van Kull / Newark Bay Federal Channels, New York and New Jersey, Phase II Deepening* (1997a), *Biological Assessment for the Peregrine Falcon (Falco peregrinus) in the Area of Arthur Kill, Kill Van Kull and Newark Bay, New York and New Jersey* (1997b), and other information provided by the Corps for Service review. A complete administrative record of this consultation is on file in the Service's Ecological Services, New Jersey Field Office.

II. CONSULTATION HISTORY

October 22, 1976	The Service provided the Corps with a preliminary report on the fish and wildlife resources in the vicinity of the Kill Van Kull and Newark Bay navigation channels project (U.S. Fish and Wildlife Service, 1976). Peregrine falcon and bald eagles were noted as occasional transients through the project area. Informal consultation was concluded with a finding that the proposed project was not likely to adversely affect any federally listed species.
January 17, 1986	The Service provided the Corps with a final Fish and Wildlife Coordination Act report on the Arthur Kill / Howland Hook navigation project (U.S. Fish and Wildlife Service, 1986). The report noted that, except for occasional transient individuals, no federally listed species were known to occur in the project area.

	Informal consultation was concluded with a finding that the proposed project was not likely to adversely affect any federally listed species.
June 1996	The Corps provided the Service with a limited re-evaluation study for the Arthur Kill / Howland Hook navigation project (U.S. Army Corps of Engineers, 1996). The report noted the presence of a peregrine falcon nest within the project area (Goethals Bridge).
June 28, 1996	The Service notified the Corps that the proposed Arthur Kill / Howland Hook navigation project may adversely affect the peregrine falcon, if the proposed dredging were to cause resuspension of contaminated sediments. The Service notified the Corps of its responsibility to prepare a Biological Assessment to address potential project-related effects to peregrine falcons.
March 12, 1997	The Corps provided the Service with its Biological Assessment of impacts to the peregrine falcon from the subject project and a determination that the peregrine falcon was likely to be adversely affected by proposed project activities (U.S. Army Corps of Engineers, 1997b).
May 16, 1997	The Service provided concurrence with the Corps finding of likely to adversely affect and provided written comments on the Corps Biological Assessment.
June 27, 1997	The Service received the Corps June 23, 1997 letter requesting initiation of formal consultation.
July 2, 1997	Representatives from the Corps and the Service met to review the formal consultation process, to discuss the subject project, and exchange information relevant to the consultation.
July 7, 1997	The Service received updated project site maps and additional information regarding sediment sampling strategies from the Corps.
July 17, 1997	The Service provided written acknowledgement of the Corps request for initiation of formal consultation and provided the Corps with the timeframes for the formal consultation period and anticipated date for issuance of the Service's Biological Opinion.
October 2, 1997	The Service provided the Corps with a draft of the Service's Biological Opinion on the subject project.
November 21, 1997	The Service received notification from the Corps via telephone that the Corps would not be providing comments on the Service's draft Biological Opinion.

III. BIOLOGICAL OPINION

A. DESCRIPTION OF THE PROPOSED ACTION

The project areas encompass two separate, but adjacent, dredging projects proposed by the Corps: the Kill Van Kull and Newark Bay Navigation Channels project and the Arthur Kill / Howland Hook Navigation Channel project. Due to the similarity and proximity of the two projects, the Service and the Corps agreed that the projects should be addressed collectively for the purpose of determining project-related impacts to the peregrine falcon. No specific dredged material disposal sites were identified within the Corps project plans; therefore, this biological opinion does not address potential impacts to federally listed species from the disposal of project-generated dredged material.

1. Kill Van Kull and Newark Bay Navigation Channels

The selected plan for the Kill Van Kull and Newark Bay Channels project includes the deepening of the federal navigation channels in the Kill Van Kull and lower Newark Bay from the previously authorized depth of 40 feet below mean low water (mlw) to a depth of 45 feet below mlw, plus a 2-foot allowance for safety clearance and maintenance to ensure project depth is achieved (U.S. Army Corps of Engineers, 1997a). Those portions of the Corps study area for the Kill Van Kull and Newark Bay Channels deepening project that are addressed within this biological opinion are shown in Figure 1. The estimated volume of material to be removed during construction of the improved navigation channel is 8.5 million cubic yards, including approximately 1.0 million cubic yards of rock. It is anticipated that some of the rock material could be removed with standard dredging equipment, while the remainder would require blasting.

The Final Environmental Impact Statement (FEIS) for the project was issued in 1980 (U.S. Army Corps of Engineers, 1980), and a supplemental FEIS was issued by the New York District in 1987 (U.S. Army Corps of Engineers, 1987). Phase I of the project (deepening the navigation channels to 42 feet below mlw) was completed in 1995. The rock that was removed during Phase I construction was used to create an artificial reef in the Atlantic Ocean off the shore of Sandy Hook, New Jersey. The non-rock material was disposed of at the Mud Dump Site, located in the Atlantic Ocean approximately 6 miles east of Sandy Hook. The current re-evaluation study is intended to update existing information to prepare for initiation of Phase II (deepening the navigation channel to 45 feet below mlw).

2. Arthur Kill / Howland Hook Navigation Channel

The recommended plan for the Arthur Kill / Howland Hook navigation channel deepening project includes the deepening of the federal navigation channel in the Arthur Kill and lower Newark Bay from the previously authorized depth of 35 feet below mlw to a depth of 41 feet below mlw from the confluence of the

Figure 1

Arthur Kill channel with the Newark Bay and Kill Van Kull channels to the Howland Hook Marine Terminal, and to a depth of 40 feet below mlw from the Howland Hook Marine Terminal to the Bayway and Tosco oil facilities; a total distance of approximately 3.1 miles. The recommended plan also includes selected bend widening and channel realignment to improve navigation safety. Those portions of the Corps study area for the Arthur Kill / Howland Hook navigation channel deepening project that are addressed within this biological opinion are shown in Figure 2. The estimated volume of material to be removed during construction of the improved navigation channel is 4.6 million cubic yards, including a large volume of rock to be removed via blasting. Additionally, project implementation would include the removal of the dilapidated U.S. Dike, located in Newark Bay, north of the navigation channel (U.S. Army Corps of Engineers, 1996).

The Final Environmental Impact Statement (FEIS) for the project was issued in 1986 (U.S. Army Corps of Engineers, 1986). The recommended plan was not implemented due to uncertainty regarding the effects of rock blasting on the foundation of the Goethals Bridge, the lack of commitment by the local project sponsor, and the absence of a tenant at the Howland Hook Marine Terminal. The Corps has since resolved the rock blasting issues and there is now a tenant at the Howland Hook Marine Terminal; therefore, the study has been revived (Burlas, pers. comm., 1996).

B. STATUS OF THE SPECIES RANGEWIDE

The American peregrine falcon (*Falco peregrinus anatum*) historically occurred throughout much of North America. In the early 1940s, the eastern United States peregrine falcon population was roughly estimated at 350 pairs. Following World War II, peregrine falcon populations declined precipitously in North America (U.S. Fish and Wildlife Service, 1987). Based on a survey conducted in 1975, the original eastern population of the American peregrine falcon was determined to be extirpated (Fyfe *et al.*, 1976). Research implicated the use of organochlorine pesticides, particularly DDT, as the primary cause of this decline (Risebrough and Peakall, 1988). Other less significant factors included shooting, natural predation, illegal egg collection, disease, human disturbance at nesting sites, and loss of habitat to human encroachment (U.S. Fish and Wildlife Service, 1987).

Due to population declines of the American peregrine falcon, the Service listed the subspecies in 1970 as endangered under the Endangered Species Conservation Act of 1969 (Public Law 91-135, 85 Stat. 275). The subspecies was later included as an endangered species on the United States list of endangered and threatened species on October 13, 1970 (35 Federal Register 16047) and subsequently was listed in 1973 as endangered under the ESA. Five recovery regions were established for the American peregrine falcon: Alaska, Canada, Pacific Coast, Rocky Mountain / Southwest United States, and Eastern United States. The Eastern United States peregrine falcon recovery region is further subdivided into five recovery units: Mid-Atlantic Coast, Northern New York and New England, Southern Appalachians, Great Lakes, and Southern New England / Central Appalachians. New Jersey is included in the Mid-Atlantic Coast recovery unit (U.S. Fish and Wildlife Service, 1995). In 1995, the

Figure 2

Service published an advance notice of intent to prepare a proposal to delist the peregrine falcon (U.S. Fish and Wildlife Service, 1995). However, the peregrine falcon has not yet been officially proposed for delisting. A final decision is pending while the Service reviews the scientific information received in response to the advance notice.

Following the ban on use of DDT and other organochlorine pesticides in the early 1970s, reintroduction programs were initiated that successfully re-established breeding populations of the peregrine falcon in the eastern United States (U.S. Fish and Wildlife Service, 1995). As a result of captive breeding programs, approximately 1,250 peregrines have been reintroduced into the eastern United States (The Peregrine Fund, 1996). By 1994, an estimated 145 pairs had established nesting territories and raised 248 young in the five recovery units within the Eastern United States recovery region. Although the rate of recovery varies somewhat among the four remaining recovery regions, positive trends in all areas suggest that peregrine falcon populations are recovering (U.S. Fish and Wildlife Service, 1995).

Peregrine falcons generally reach sexual maturity at three years of age. Usually, the male arrives at a nesting site and begins a series of acrobatic displays to attract a mate (U.S. Fish and Wildlife Service, 1987). Peregrines typically scrape shallow hollows for nests in gravel or debris on a ledge or bluff, in an area with a clear view of the surroundings (DeGraaf and Rudis, 1986). Reintroduced peregrines are also known to nest on tall buildings, bridges, and other man-made structures. Peregrines tend to return to the same nest each year and vigorously defend individual nesting territories. An average clutch of four eggs is laid in late March or April (U.S. Fish and Wildlife Service, 1987).

Peregrine falcons generally prefer open areas such as coastal marshes, high mountains, and open forested regions with rocky ledges overlooking rivers, lakes, or other water, near an abundance of prey items (DeGraaf *et al.*, 1991). In the northeast, some peregrine falcons have adapted to a more urban environment, nesting and roosting on tall buildings or artificial nest structures. In the eastern United States, peregrines winter primarily along the Atlantic Coast on barrier beaches or in cities (DeGraaf and Rudis, 1986). Peregrines generally prey on common passerine birds, gulls, terns, shorebirds, wading birds, and waterfowl (U.S. Fish and Wildlife Service, 1987; Ehrlich *et al.*, 1988).

C. ENVIRONMENTAL BASELINE

1. Status of the Species Within the Action Area

A total of 12 pairs of peregrine falcons are known to nest on buildings and bridges in the New York City metropolitan area (Clark, 1996; Nadareski, pers. comm., 1997). Two of these peregrine falcon nesting sites occur within the project area at the Goethals and Bayonne Bridges. In addition, peregrines nesting on the Outerbridge Crossing may occasionally forage within wetland habitats that may be affected by resuspended sediments from the proposed project activities.

In general, overall productivity of bridge nesting pairs is low due to poor nest sites and disturbance. However, nesting success can be enhanced through the use of nesting boxes placed on bridges. A summary of breeding success for nesting peregrine falcon pairs that may be adversely affected by the proposed project is provided in Table 1.

Table 1. Peregrine Falcon Breeding Summary

Site Name	**Nest Outcome (Young Hatched / Fledged)**							
	1989	1990	1991	1992	1993	1994	1995	1996
Outerbridge Crossing	T[1]	T	T	T	T	T	AF[2]	U[3]
Goethals Bridge	-	T	T	T	4/4	3/3	3/3	AF
Bayonne Bridge	-	-	-	-	-	-	AF	T

1 Territorial pair observed during breeding season
2 Site Active (breeding), but failed
3 Outcome Unknown

2. Effects of the Action

In evaluating the effects of the federal action under consideration in this consultation, 50 CFR 402.2 and 402.14(g)(3) require the Service to evaluate both the direct and indirect effect of the action on the species, together with the effects of other activities that are interrelated or interdependent with the action that will be added to the environmental baseline.

a. Disturbance

The direct effect of the action on peregrine falcons will be the disturbance created during the dredging operations. While the Service acknowledges that peregrines nesting within the New York City area appear to have adapted to daily levels of ambient noise and line-of-sight visual disturbances that are greater than levels found at tower or natural cliff sites, the threshold levels of disturbance that cause nest abandonment or stress-induced reproductive failure are not clearly understood and may vary from bird-to-bird. Dredging and blasting activities will necessitate human activity directly beneath the Goethals and Bayonne Bridges and will increase noise and use of equipment at these sites during the initial deepening activities and periodically during maintenance dredging operations over the life of the project (50 years).

These activities may cause the birds to abort a nesting attempt during a particular year or may disturb the birds during incubation by causing stress or by flushing the incubating bird off of the nest. During such disturbance, eggs could be expelled from the nest inadvertently by adults. Excessive stress during incubation could cause increased metabolism, which could increase the need for food. This additional need would lengthen the amount of time the birds are required to spend away from the nest engaged in foraging activity. Egg cooling could result, causing the death of one or more embryos. Disturbance from dredging activities could have similar effects on hatchlings by causing increased stress and therefore increased food demands on adults and hatchlings. Disturbance-induced stress on hatchlings could result in their exiting the nest prematurely and may result in unfledged birds falling from the nesting support structure. Such breeding interruptions could cause nest abandonment, reduced clutch size, embryo death, malnutrition of hatchlings or adults, and/or premature nest departure and death of fledglings.

Due to the transient nature of peregrine falcons during the non-breeding season, the Service does not anticipate adverse impacts to non-nesting birds. If flighted birds are disturbed by construction activities during the non-breeding season, they will most likely move to other similar habitat for roosting, resting, and feeding.

b. Contaminants

Indirect effects are defined as those that are caused by the proposed action and are later in time, but are still reasonably certain to occur (50 CFR 402.02). Channel deepening may result in the resuspension and redistribution of sediments that contain high levels of contaminants. While suspended, contaminated sediments may be transported into shallow water habitats that attract and support wildlife, which in turn may comprise a prey base for peregrine falcons.

Contaminants that bioaccumulate have the potential to increase in concentration through trophic transfer to levels in resident biota that are harmful to their predators. Due to its high position in the food chain, the peregrine falcon is at risk of significant dietary exposure to persistent, bioaccumulating environmental contaminants.

Because of the concentrations that have been found in the system, and their toxicity, persistence, and potential for bioaccumulation, polychlorinated dibenzo-p-dioxins (PCDDs, or dioxins), polychlorinated dibenzofurans (PCDFs, or furans) and polychlorinated biphenyls (PCBs) are considered the contaminants of concern (COCs) in the sediments within the proposed project area.

Dioxins and furans are a family of 210 compounds of which the most familiar and most toxic is 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). The other dioxin and furan congeners have the same effects as TCDD, but are less potent. Common effects of TCDD and related compounds in avian species include, but are not limited to, wasting syndrome, immunotoxicity, reproductive impairment, porphyria, and liver damage. Dioxins and dioxin-like compounds accumulate in birds primarily through dietary exposure. Portions of the substances accumulated in the tissues of female birds are translocated to eggs where they have the potential to cause embryotoxicity (e.g., Nosek *et al*., 1992; 1993). Developing embryos and young are more sensitive than adults to the toxic effects of dioxins, and symptoms of dioxin toxicity are species-specific (Hoffman *et al*., 1996). Depending on the species, the most sensitive signs of toxicity in exposed avian embryos may be enzyme induction, gross deformities, or mortality (Nosek *et al*., 1993).

Polychlorinated biphenyls are a group of 129 compounds, of which the most toxic are congeners that assume a coplanar conformation similar to that of TCDD (Hoffman *et al*., 1996). Because they are dioxin-like, coplanar PCBs add to the potential for adverse effects caused by exposure to TCDD. Although coplanar PCBs have the same effects as TCDD, they are not as potent as TCDD. Dioxin-like PCBs have been shown to cause embryo mortality in wildlife species such as ring-necked pheasant (*Phasianus colchicus*), mallard (*Anas platyrhynchos*), goldeneye (*Bucephala clangula*) and black-headed gull (*Larus ridibundus*) (Brunstrom, 1988; Brunstrom and Reutergardh, 1986). A clear picture of congener-specific toxicity has not yet emerged. The potency of individual congeners is highly dependent on both the test species and the measured response (Hoffman *et al*., 1996). Congeners 77 and 126 appear to be the most potent of the coplanar congeners.

Most of the PCBs are non-coplanar compounds that exert toxicity separate from that of the dioxin-like congeners. Toxicological effects observed with PCBs, which are generally present as complex mixtures (Aroclors), depend on the mixture and the species of the receptor. Death, reproductive failure, immunosuppression, liver damage, and wasting syndrome have been attributed to PCB exposure in wildlife (Hoffman *et al*., 1996).

(1) Effect Levels of PCDDs, PCDFs, and PCBs on Avian Species

The potential for adverse effects was assessed by considering effect levels for dioxins, furans and PCBs in eggs and in the diet. As lipophilic compounds, dioxins, furans and PCBs are readily transferred from the adult female to the egg. Therefore, measured contaminant concentrations in eggs can indicate the potential for reproductive failure, as well as provide an indication of exposure of the female bird to contaminants prior to egg-laying.

Diet is the primary route of exposure for the COCs. Consequently, dietary effect levels provide a measure of exposure when direct measures are not possible.

(a) Dioxins and furans in eggs

Effect levels have been identified for TCDD alone and in combination with other less-potent dioxin and furan congeners. Concentrations of dioxin / furan mixtures are expressed in terms of TCDD equivalents (TCDD-EQ), using conversion factors for the non-TCDD dioxins, furans, and dioxin-like PCBs such as those described by Ahlborg *et al*. (1992; 1994) and Hoffman *et al*. (1996).

Concentrations in eggs of TCDD and TCDD-EQ associated with adverse effects are shown in Table 2. As indicated, TCDD concentrations at which adverse effects have been observed among avian embryos in laboratory studies have ranged from 6 parts per trillion (ppt) in chickens to 2,200 ppt in ring-necked pheasants. Reports of TCDD and TCDD-EQ concentrations associated with adverse effects in wild populations have ranged from approximately 20 ppt to 230 ppt in a variety of species.

(b) Dioxins and furans in avian diets

No reports have been found relating dietary TCDD or TCDD-EQ concentrations to adverse effects in birds. However, in studies on resident gulls from Lake Ontario, Braune and Norstrom (1989) related concentrations of PCDDs, PCDFs and PCBs in bird tissues and eggs to concentrations in fish upon which the gulls feed. Because the birds were resident, contaminant concentrations in their tissues were assumed to be steady state. Braune and Norstrom (1989) observed that the concentration of TCDD in gulls was 32 times that in their diet. The concentration of TCDD in eggs was 21 times that measured in fish. Factors observed by Braune and Norstrom (1989) provide a preliminary means for back calculating from effect levels in eggs to potential effect concentrations in the diet of the egg-laying parent. Using factors from Braune and Norstrom (1989) and effect levels summarized in Table 2, it is estimated that dietary TCDD concentrations that may lead to unsafe levels in eggs range from 0.3 ppt to 105 ppt.

Table 2. Observed Effect Levels of TCDD and TCDD Equivalents in Bird Eggs

Species	Endpoint	Effect Level	Reference
	TCDD (pg/g or parts per trillion)		
Chicken	embryo mortality in egg injection study (onset)	10 - 20	Verrett, 1970 (as cited by Hoffman *et al*., 1996)
	cardiovascular malformations in egg injection study (20% increase)	6	Cheung *et al*., 1981
	embryo mortality in egg injection study (median)	147	Verrett, 1976
	embryo mortality in egg injection study (median)	250	Allred and Strange, 1977 (as cited by Nosek *et al.*, 1993)
	embryo mortality in egg injection study (100%)	1,000	Higginbotham *et al.*, 1968
Ring-necked pheasant	embryo mortality in egg injection study (median)	1,300 - 2,200	Nosek *et al*., 1993
Eastern bluebird	embryo mortality in egg injection study (median)	<10,000	Nosek *et al*., 1993
Great blue heron	brain asymmetry in wild populations	211	Henshel *et al*., 1995 (as cited by Hoffman *et al*., 1996)
	TCDD EQUIVALENTS (pg/g or parts per trillion)		
Great blue heron	reproductive failure in wild populations	230	Elliott *et al.*, 1989
Wood duck	reproductive impairment threshold	20 - 50	White and Seginak, 1994
Forster's tern	No effect in wild populations	23	Tillitt *et al.*, 1993
	embryotoxicity, poor hatching success, congenital deformities in wild populations	215	Tillitt *et al.*, 1993
Double-crested cormorant	embryo mortality increased in wild populations	85	Tillitt *et al.*, 1992

(c) PCBs in eggs

Observed effect levels in eggs of individual PCB congeners and Aroclor mixtures (total PCBs) are shown in Tables 3 and 4, respectively. Studies on PCBs historically related effects to total Aroclor concentrations. More recent studies have focused on individual congeners. Results of both kinds of studies are provided to: (1) better define critical effect levels, and (2) enable comparisons with earlier studies in which concentrations are reported as total PCBs.

Depending on the species examined, the toxicity associated with individual coplanar PCB congeners has been shown to range over several orders of magnitude (Table 3). Concentrations of PCB 77 as low as 3 ppb have caused mortality in chicken embryos whereas concentrations as great as 5,000 ppb have had no discernable effect on duck embryos. Observed adverse effect levels of PCB 126 are lower than those reported for PCB 77. Concentrations of PCB 126 that cause median lethality among exposed embryos range from 0.3 ppb in chickens to 65 ppb in American kestrel. Although reduced hatching success and embryo mortality are commonly reported effects of exposure to PCBs 77 and 126, other adverse effects have been observed as well (Table 3).

Total PCB concentrations greater than 5 parts per million (ppm) have been shown to reduce egg hatchability and cause embryotoxicity such as edema, growth retardation, and deformities in laboratory birds (Platonow and Reinhart, 1973, as cited by Hoffman *et al.*, 1996). Results of egg injection studies indicate that total PCB concentrations associated with embryotoxicity have ranged from 0.05 ppm for chickens to 105 ppm for mallards (Table 4).

(d) PCBs in avian diets

Potential dietary effect levels for individual PCB congeners may be estimated using biotransfer factors measured by Braune and Norstrom (1989) for tetra-, penta-, and hexachloro- PCB congeners in herring gulls. Results of their study showed that concentrations of PCBs in gulls were 68 times the concentration in their diet. The PCB concentration in gull eggs was 26 times that measured in fish. Based on effect levels in eggs shown in Table 3, estimated dietary PCB 77 concentrations that may lead to embryotoxicity range from approximately 0.12 to 38 ppb. Estimated dietary PCB 126 concentrations that may lead to embryotoxicity range from 0.02 to 2.5 ppb.

Studies on dietary effect levels of total PCBs have been conducted with Aroclor mixtures. Reproductive effect levels observed with Aroclor mixtures are summarized in Table 5. Dietary effect levels that have been observed with Aroclor 1254 range from 5 to 33 ppm. Limited data indicate that effect levels for Aroclors 1242 and 1248 are also within that range.

Table 3. Observed Effect Levels of PCB 77 and PCB 126 in Bird Eggs

Species	Endpoint	Effect Level	Reference
	PCB 126 (ng/g or parts per billion)		
Chicken	embryo mortality in egg injection study (median)	0.4 - 3	Hoffman *et al.*, 1998 Brunstrom and Andersson, 1988
American kestrel	embryo mortality (10%), hatchling weight, liver weight, edema and malformations, in egg injection study	2.3	Hoffman *et al.*, 1998
	embryo mortality (24%), hatchling weight, liver weight, edema and malformations in egg injection study	23	Hoffman *et al.*, 1998
	embryo mortality in egg injection study (median)	65	Hoffman *et al.*, 1998
Bobwhite	embryo mortality in egg injection study (median)	24	Hoffman *et al*., 1995*
Common tern	embryo mortality in egg injection study (35%)	45	Hoffman *et al*., 1995*
	embryo mortality in egg injection study median	104	Hoffman *et al*., 1998
	PCB 77 (ng/g or parts per billion)		
Chicken	embryo mortality in egg injection study (median)	3 - 40	Hoffman *et al*., 1998 Brunstrom and Andersson, 1988 Vos *et al.*, 1982*
American kestrel	reduced hatching in egg injection study (40%)	100	Hoffman *et al.*, 1998
Turkey	embryo mortality in egg injection study	200 - 1,000	Brunstrom and Lund, 1988*
Mallard	no effect in egg injection study	5,000	Brunstrom, 1988
Goldeneye	no effect in egg injection study	5,000	Brunstrom, 1988

* As cited in review by Hoffman *et al.*, 1996

Table 4. Observed Effect Levels of Total PCBs in Bird Eggs

Species	Endpoint	Effect Level	Reference
	Total PCB (µg/g or parts per million)		
Chicken	embryo mortality in egg injection study	10 (Aroclor 1242)	Blazak and Markam, 1975*
	reduced hatching in egg injection study	5 (Aroclor 1248)	Brunstrom and Orberg, 1982*
	reduced enzyme activity in egg injection study	0.05 - 0.10 (Aroclor 1254)	Srebocan *et al.*, 1977*
Ringed turtledove	embryo mortality, parental inattention in parental diet study	16 (Aroclor 1254)	Peakall and Peakall, 1973*
Forsters tern	hatchability 50% below normal in wild populations	6 - 26 (total PCB)	Kubiak et al., 1989
White-tailed sea eagle	No effect in a wild population	5 - 10 (total PCB)	Helander *et al*., 1982*
	Increased incidence of bill defects in a wild population	19 - 159 (total PCB)	Helander *et al*., 1982*
Mallard	decreased eggshell thickness in parental diet study	105 (Aroclor 1242)	Haseltine and Prouty, 1980*
Screech owl	no effect in parental diet study	4 - 18 (Aroclor 1248)	McLane and Hughes, 1980
Atlantic puffin	no effect, parent dosed by implant	10 - 81 (Aroclor 1254)	Harris and Osborn, 1981*

* As cited in review by Hoffman *et al.,* 1996

Table 5. Observed Effect Levels of PCBs in Bird Diets

Species	Endpoint	Effect level (µg/g or ppm)	Reference
American kestrel	reduced semen quality	33 (Aroclor 1254)	Bird *et al.*, 1983
mallard	no effect on reproductive success	25 (Aroclor 1254)	Custer and Heinz, 1980
mourning dove	courtship behavior	10 (Aroclor 1254)	Tori and Peterle, 1983
chicken	egg hatchability	20 (Aroclor 1242)	Britton and Huston, 1973
	reduced egg production	5 (Aroclor 1254)	Platonow and Reinhart, 1973 (as cited by USEPA, 1995)
	reduced chick growth	2 (Aroclor 1248 or 1254)	Lillie *et al.*, 1974 (as cited by USEPA, 1995)

(e) Benchmarks for dioxins and furans in peregrine falcons

Three toxicity threshold concentrations were used to evaluate potential for toxicity by dioxins and furans in peregrine eggs. The benchmarks are as follows.

(i) A concentration of 10 ppt was selected as the benchmark for effects in sensitive species for TCDD and TCDD-EQ. This concentration has been demonstrated to cause embryonic mortality, edema, and teratogenic effects in the most sensitive avian species (i.e., chicken) (Verrett, 1970). The 10 ppt benchmark has also been used in the Great Lakes Initiative to evaluate the sublethal effects of TCDD (U.S. Environmental Protection Agency, 1995). TCDD-EQ levels exceeding the 10 ppt toxicity reference value would be predictive of the above toxicological effects in sensitive species.

(ii) A TCDD-EQ concentration of 50 ppt is the toxicity benchmark for documented effects in wild birds. Eggs with TCDD-EQ concentrations greater than 50 ppt have been associated with effects on reproduction or development in wood ducks, Forster's terns, and double-crested cormorants.

(iii) A TCDD-EQ concentration of 147 ppt is the benchmark for embryonic lethality. This concentration caused median lethality in chickens (Verrett, 1976).

Preliminary estimates of dietary concentrations that may result in benchmark concentrations for TCDD in eggs are 0.48 ppt for adverse effects in sensitive species, 2.4 ppt for observed effect levels in wild avian species, and 7.0 ppt for lethality.

(f) Benchmark levels for PCBs in peregrine falcons

Benchmark concentrations were identified for PCB 77, PCB 126 and total PCBs in eggs to evaluate potential for embryotoxicity in peregrines. The benchmark for PCB 126 is 2.3 ppb and the benchmark for PCB 77 is 100 ppb. These values are based on studies with closely related species and represent observed increases in embryonic mortality of 10 and 40 percent, respectively (Hoffman *et al*., 1998).

The estimated dietary concentrations of PCB 126 and PCB 77 that correspond with benchmark concentrations and potential effects in eggs are 0.09 ppb and 3.8 ppb, respectively.

A benchmark of 5 ppm was selected for total PCBs in eggs. This benchmark is based on effect levels observed with eggs of laboratory birds. Concentrations greater than 5 ppm have been shown to reduce egg hatchability and cause embryotoxicity in laboratory birds (Hoffman *et al.*, 1996). The selected benchmark is comparable to conclusions of Kubiak and Best (1991) and Helander *et al*. (1982), who independently determined that a level of 5 to 10 ppm or less in eggs was necessary for "healthy" reproduction in eagles (as cited in Hoffman *et al*., 1996).

An observed effect level of 5 ppm was selected as the benchmark for total PCBs in the diet. Dietary concentrations greater than 5 ppm have resulted in reduced fertility and chick growth in chickens (Lillie *et al*., 1974; Platonow and Reinhart, 1973).

(2) Potential Exposure

The potential for peregrine falcons to be exposed and adversely affected by dioxins, furans and PCBs as a result of the proposed project depends on a number of factors. Major factors to consider include: (1) the concentration of contaminants in project sediments; (2) contaminant levels in components of the aquatic food web; (3) peregrine consumption of prey from local aquatic-based food webs; and, (4) the current level of exposure in peregrines.

(a) Concentrations of PCDDs, PCDFs and PCBs in project sediments

Contaminant concentrations have not yet been measured in project sediments per se (U.S. Army Corps of Engineers, 1997a). Using bathymetry, the U.S. Army Corps of Engineers

(1997a) estimated that only 30 percent of the material to be removed from the Kill Van Kull / Newark Bay project will be contaminated. Approximately 70 percent of the material to be removed for the Arthur Kill / Howland Hook project is expected to bear significant levels of contamination. Portions of the projects that entail removal of sand, rock, and bedrock raise no contaminant-related concerns. Fine-grained sediment that has been chemically analyzed and shown to have relatively low levels of contamination (e.g., preindustrial subsurface sediment) is also of no concern from a contaminants perspective.

Fine-grained sediments deposited since approximately 1945 are assumed to have high levels of COCs, among other contaminants. Studies conducted by the National Oceanic and Atmospheric Administration (NOAA) (1995) provide some indication of dioxin and PCB concentrations in surface sediments from the project areas. The mean concentrations of TCDD observed by NOAA (1995) in the top two centimeters of sediments from 53 Newark Bay stations was 100 ppt, with a range of 5 ppt to 463 ppt. Bopp *et al*. (1991) observed TCDD concentrations between 230 ppt and 310 ppt in surface sediments from three Newark Bay locations. Neither study determined TCDD concentrations in Arthur Kill sediments. Total PCB concentrations found by NOAA (1995) were between 400 and 2,000 ppb (mean of 800 ppb) in Newark Bay sediments and between 200 ppb and 800 ppb (mean of 530 ppb) in Arthur Kill sediments.

The TCDD concentrations reported by NOAA (1995) are among the highest for sediments from dioxin-contaminated sites in the United States (U.S. Environmental Protection Agency, 1993). Similarly, total PCB concentrations observed by NOAA (1995) in Newark Bay and Arthur Kill sediments are comparable to the highest (top 15) reported by NOAA (1988) for sediments from 200 coastal and estuarine sites throughout the United States. Results of the study by Bopp *et al*. (1991) demonstrate that the TCDD concentration in subsurface sediments deposited between approximately 1945 and 1970 may be an order of magnitude higher (i.e., over 1,000 ppt). If the highly contaminated subsurface sediments are resuspended during dredging and migrate into neighboring shallow water habitat, contaminant concentrations in surface sediments in those areas may be significantly increased.

(b) <u>Concentrations of PCDDs, PCDFs and PCBs in prey species from the project area</u>

No data have been found on dioxin, furan, and PCB concentrations in avian species likely to be consumed by peregrine falcons in the New York - New Jersey Harbor area. However, concentrations of PCBs have been measured in peregrine prey species from less contaminated aquatic-based systems in New Jersey (U.S. Fish and Wildlife Service, 1991). Willet (*Catoptrophorus semipalmatus*), fish crow (*Corvus ossifragus*) and short-billed dowitcher (*Limnodromus griseus*) are among the species identified as preferred prey for peregrine falcons nesting in coastal areas of Cape May County, New Jersey (Steidl, 1990). Samples of the first two species were collected in 1989 for chemical analysis by the Service (1991). Total PCB concentrations observed in willet and fish crows were 0.38 ppm and 1.7 ppm, respectively. Such PCB concentrations approach the benchmark of 5 ppm for effects in sensitive species.

Results of the Service's (1991) study demonstrate that: (1) peregrine falcons may be exposed to bioaccumulating contaminants transported through aquatic-based food webs; and, (2) PCB loads in potential peregrine prey species from areas in New Jersey with less contamination than the New York - New Jersey Harbor approach dietary effect levels for avian species.

Results of studies conducted since 1985 demonstrate that aquatic biota in the Newark Bay system contain unusually high levels of dioxins and PCBs. Concentrations of TCDD measured in fillets of finfish species have ranged from 1.7 ppt in winter flounder (*Pleuronectes americanus*) (Skinner *et al*., 1997a) to more than 31 ppt in fillets of adult striped bass (*Morone saxatilis*) (Belton *et al*., 1985; Skinner *et al*., 1997a). Concentrations of TCDD measured in the muscle of blue crabs (*Callinectes sapidus*) from Newark Bay range from 3 ppt to 30 ppt (Skinner *et al.*, 1997a; Cai *et al*., 1994), whereas concentrations in the hepatopancreas range from 155 ppt to 620 ppt (Belton *et al*., 1985; Skinner *et al*., 1997a; Cai *et al*., 1994). Concentrations of total PCBs observed by Skinner *et al*. (1997b) in Newark Bay biota were between 0.12 ppm and 4.7 ppm in finfish fillets (13 species sampled), approximately 0.25 ppm in two species of bivalve mollusks, 0.05 ppm in blue crab muscle, and 6.6 ppm in blue crab hepatopancreas. Studies to determine whole body TCDD and PCB concentrations in Newark Bay finfish were recently undertaken by the Service's New Jersey Field Office to specifically address ecological concerns. Preliminary results indicate that mean whole body TCDD concentrations in white perch (*Morone americana*) and juvenile striped bass from Newark Bay are 153 ppt and 27 ppt, respectively. Once computed, whole body TCDD-EQ concentrations will be even greater due to the presence of other dioxin congeners, furans, and coplanar PCBs. Mean whole body concentrations of total PCBs were found to be 2.9 ppm in white perch and 1.8 ppm in juvenile striped bass (U.S. Fish and Wildlife Service, unpublished data).

Concentrations of TCDD observed in finfish from Newark Bay are among the highest reported for fish from sites throughout the United States. According to the U. S. Environmental Protection Agency (1993), the maximum TCDD concentration observed in fish collected in 1983 from 395 locations for the National Dioxin Survey was 85 ppt. By comparison, the maximum concentration observed in white perch from Newark Bay was 208 ppt (U.S. Fish and Wildlife Service, unpublished data). Concentrations of total PCBs in Newark Bay finfish are typical of total PCB concentrations (1 ppm to 15 ppm) reported for finfish from marine ecosystems with sources of local contamination (Niimi, 1996). Species that routinely consume fish from Newark Bay are expected to have correspondingly high levels of TCDD and PCBs in their tissues, as has been documented for Lake Ontario gulls (Braune and Norstrom, 1989).

(c) Peregrine prey from the local aquatic-based food web

Avian species whose diets may include highly contaminated fish from the Newark Bay system include terns and colonial nesting water birds (egrets, herons, and cormorants) that comprise the "Harbor Herons" (U.S. Fish and Wildlife Service, 1996). Studies on species consumed by peregrine falcons nesting in Manhattan are reviewed in the biological assessment conducted by the U.S. Army Corps of Engineers (1997b). As indicated, preliminary analyses by the New York City Department of Environmental Conservation indicate that peregrines residing in the city primarily consume rock dove (*Columba livia*), blue jay (*Cyanocitta cristata*) and European starling (*Sturnus vulgaris*). However, prey taken by peregrines nesting nearer the water was not determined. Peregrines are known to consume a variety of species that include grebes (*Podicipodidae*), small herons, ducks, coots (*Fulica americana*), small gulls and terns (Bent, 1961). Willet, fish crow, and short-billed dowitcher were found by Steidl (1990) to constitute nearly 50 percent of the biomass in the diet of peregrine falcons nesting in coastal Cape May County, New Jersey. It is assumed for this biological opinion that species linked with the aquatic food web are a significant portion (up to 50 percent by mass) of the diet of peregrines residing in the New York - New Jersey Harbor area.

(d) Current level of exposure in peregrines

Whether increased environmental dioxin and PCB levels caused by the proposed project will be sufficient to adversely affect peregrines depends in part on pre-project contaminant levels in peregrines and their eggs. If exposure levels are high to begin, even small increases in exposure may result in the exceedance of thresholds for adverse effects.

In recent studies reported by the Service and New Jersey Department of Environmental Protection (1997), previously collected non-viable peregrine falcon eggs from nests in coastal areas of southern New Jersey were analyzed for PCBs and dioxins. The mean concentration of TCDD-EQ in eggs from Atlantic coast nests was 496 ppt. This concentration exceeds benchmark levels at which adverse effects are expected in peregrine falcons. Contaminant levels have not been measured in eggs of peregrines from the New York - New Jersey Harbor area. However, the dioxin and PCB concentrations are expected to be higher than those observed in eggs from less contaminated coastal areas in New Jersey. It is likely that current exposure levels are significant and even small increases will have adverse effects.

(3) Cumulative Effects

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA. No specific dredged material disposal sites were identified within the Corps project plans; therefore, this biological opinion does not address potential impacts to federally listed species from the disposal of project-generated dredged material. Further consultation pursuant to Section 7 of the ESA will be required if disposal sites for project-generated dredged material are identified within the vicinity of documented occurrences of federally listed species.

Indirect cumulative effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur. Indirect cumulative effects on peregrine falcons will occur from increased shipping traffic within federal navigation channels beneath the Goethals, Bayonne, and Outerbridge Crossing bridges, potentially causing increased stress on peregrine falcons nesting at these sites.

D. CONCLUSION

After reviewing the current status of the peregrine falcon, the environmental baseline for the action area, the effects of the proposed dredging projects and the potential cumulative effects, it is the Service's biological opinion that the channel deepening activities proposed by the Corps within the Arthur Kill, Kill Van Kull, and Newark Bay channels, New York and New Jersey, are not likely to jeopardize the continued existence of the peregrine falcon. No critical habitat has been designated for this species; therefore, no critical habitat will be affected.

IV. INCIDENTAL TAKE STATEMENT

A. DEFINITION OF INCIDENTAL TAKE

Sections 4(d) and 9 of the ESA, as amended, prohibit take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by a federal agency or an applicant. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by the Corps so that they become binding conditions of any grant, permit, or contract issued to an applicant or contractor, as appropriate, in order for the exemption in Section 7(o)(2) to apply. The Corps has a continuing responsibility to regulate the activity covered by this incidental take statement. If the Corps: (1) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, grant, or contract document and / or, (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse.

B. AMOUNT OR EXTENT OF TAKE

The Service anticipates that channel deepening activities proposed by the Corps within the Arthur Kill, Kill Van Kull, and Newark Bay channels, New York and New Jersey, could result in unsuccessful nesting attempts, nest abandonment, or impaired reproduction in up to three pairs of peregrine falcons each year for the life of the project (50 years). The incidental take is expected to occur in the form of harassment of adults and their progeny and impaired reproduction in up to three pairs of peregrine falcons, resulting in the loss of up to four peregrine falcon fledglings (total) per year over the life of the project. This level of take is based on the current number of pairs occupying the project area and current nest outcome. The Service anticipates that this level of incidental take of peregrine falcons will be difficult to detect because identifying the precise source of reproductive impairment in an individual bird or a non-viable egg is unlikely.

Take in the form of harassment would result from increased audible and visual disturbance to peregrines during project construction. Although peregrine falcons nesting on the Goethals, Bayonne, and Outerbridge Crossing bridges are currently subjected to a great deal of ambient noise, sounds associated with construction will be louder and more constant than those to which peregrines at these sites have become accustomed. Such noises may include human voices, generators, cranes, dredges, waterborne vessel motors, and blasting devices. Increased human and watercraft presence in the vicinity of the nesting sites may increase line-of-sight visual disturbance. Harassment will continue after construction through periodic maintenance dredging and increased shipping activity in the immediate vicinity of Goethals, Bayonne, and Outerbridge Crossing bridges.

Take in the form of reproductive impairment would result from audible and visual disturbance and from exposure to contaminants due to resuspension and redistribution of previously buried sediments containing exceptionally high levels of dioxins and PCBs. This conclusion of reproductive impairment due to contaminant exposure is based on evidence that sediments in Newark Bay and the Kill Van Kull have high levels of dioxins and PCBs, and that concentrations may be an order of magnitude higher in subsurface sediments. There is also evidence that biota in the Newark Bay system have among the highest observed levels in the United States of dioxins and PCBs in their tissues.

Evidence from studies conducted outside the New York - New Jersey Harbor area indicates that: (1) avian species that consume aquatic biota may accumulate dioxins and PCBs to levels that are 30 (dioxins) to 68 (PCBs) times those in the diet; (2) the diet of peregrine falcons nesting in coastal areas may include birds that consume aquatic biota; and, (3) peregrines nesting in coastal, less contaminated parts of New Jersey currently experience dioxin and PCB exposures that exceed thresholds for adverse effects.

Given existing levels of contamination in the system, peregrine falcons feeding in the area of the proposed project are likely to have levels of dioxins and PCBs in their diets and their tissues that exceed thresholds for adverse effects. Activities that increase the concentration of dioxins and PCBs available for uptake by aquatic biota, such as resuspension of subsurface sediments, will only add to the frequency and / or severity of adverse effects that may result.

This assessment is based on assumptions that: (1) existing levels of dioxins and furans in peregrine falcons from the New York - New Jersey Harbor area exceed thresholds for adverse effects; (2) avian species that consume aquatic biota from Newark Bay accumulate dioxins and PCBs to levels in their tissues that exceed dietary benchmarks for adverse effects in peregrines; (3) avian species that consume aquatic biota from Newark Bay constitute a significant component of the peregrine diet; and, (4) resuspension of highly contaminated subsurface sediments will effectively increase the amount of dioxins and PCBs available for uptake by food web organisms. Studies that address the aforementioned assumptions would reduce uncertainty about the potential for peregrine falcons to experience significant exposure to dioxins and PCBs from the proposed project.

C. EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

D. REASONABLE AND PRUDENT MEASURES

The Service has concluded that the following reasonable and prudent measures are necessary and appropriate to minimize take of peregrine falcons.

1. Implement time-of-year restrictions on channel construction / maintenance activities to minimize the likelihood that nesting birds will abandon the nest or that unfledged young will die.

2. Reduce the likelihood of peregrine falcon exposure through the aquatic food web to resuspended and redistributed contaminants due to channel deepening activities.

E. TERMS AND CONDITIONS

In order to be exempt from the prohibitions of Section 9 of the ESA, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. During each year of the period of project construction, the Corps must conduct surveys to monitor peregrine nesting activity on the Goethals and Bayonne Bridges. Surveys must be conducted by a qualified individual, approved by the Service, on a weekly basis during the period of March 1 through July 31 of each year, unless the Service has determined that nesting activity has been discontinued during that particular nesting season. The Corps must submit the results of each weekly survey to the Service's New Jersey Field Office within one week after the survey.

2. During the period of March 1 - July 31 of each year during project construction and subsequent maintenance dredging, if nesting is confirmed, the Corps may not conduct any construction activities within 0.25 mile of a peregrine falcon nest. No operation of waterborne channel deepening equipment will be allowed within a 0.25-mile radius of the point directly below the nest at the river surface. If nesting is confirmed, this 0.25-mile radius must be marked by buoys between March 1 and July 31 of each year while construction or maintenance is ongoing. These conditions must be adhered to unless the following conditions exist and have been agreed to by the Service:

    a. the nest has been abandoned, or

    b. the nestlings have fledged prior to July 31 and it is determined that construction conducted after fledging and before July 31 will have no effect on the fledged peregrine falcons or their parents, or

    c. all hatchlings have been removed from the nest for biological purposes by qualified, Service-approved individuals.

3. Conduct both surface and subsurface testing of potentially contaminated (i.e., fine grained) materials for dioxins and PCBs.

4. Use environmentally sensitive methods for dredging, such as closed clamshell dredge and no barge overflow or other best management practices, in reaches with potentially contaminated (i.e., fine grained) materials unless chemical analysis of surface and subsurface sediments

demonstrates that dioxin and PCB levels are at or below the minimum reported by NOAA (1995) for surface sediments in Newark Bay (5 ppt TCDD and 400 ppb total PCBs).

5. Establish the baseline contaminant exposure levels in peregrine falcons nesting on the Goethals, Bayonne, and Outerbridge Crossing bridges and conduct monitoring to ensure exposure is not occurring through:

   a. analysis of archived and any future non-viable eggs for congener-specific dioxins / furans, total PCBs, and coplanar PCBs; and,

   b. analysis of specimens of dead peregrines for the above contaminant loads.

6. Determine the prey base of peregrine falcons nesting on the Goethals, Bayonne, and Outerbridge Crossing bridges to determine the potential pathway for exposure to resuspended bioaccumulating contaminants through:

   a. analysis of any available archived prey items taken from the subject peregrine falcon nests; and / or,

   b. observations of foraging activity by adult birds and of prey items fed to nestlings.

7. Monitor prey species by chemical analyses or non-destructive biomarkers (if available) for evidence of exposure to resuspended bioaccumulating compounds.

8. Care must be taken in handling any specimens of dead peregrine falcon adults, nestlings, or non-viable eggs to preserve biological material in the best possible state. In conjunction with the preservation of any specimens, the finder has the responsibility to ensure that evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The finding of dead or non-viable specimens does not imply enforcement proceedings pursuant to the ESA. The reporting of dead specimens is required to enable the Service to determine if take is reached or exceeded and to ensure that the terms and conditions are appropriate and effective. Upon locating a dead bird, initial notification must be made to the following Service Law Enforcement office:

   Senior Resident Agent
   U.S. Fish and Wildlife Service
   Division of Law Enforcement
   Hemisphere Center
   Routes 1 & 9 South
   Newark, New Jersey 07114

(201) 645-5910

Upon locating a non-viable egg specimen, initial notification must be made to the following Service office:

Supervisor
U.S. Fish and Wildlife Service
New Jersey Field Office
927 N. Main Street, Bldg. D-1
Pleasantville, New Jersey 08232
(609) 646-9310

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. With implementation of these measures the Service estimates that no more than four non-viable peregrine falcon eggs or unfledged young will be incidentally taken per year. If, during the course of the action, this minimized level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The Corps must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

V. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of ESA directs federal agencies to utilize their authorities to further the purposes of ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

A. Conduct studies that will reduce uncertainty about exposure of peregrine falcons to dioxins and PCBs from sediments in the New York - New Jersey Harbor. Although this action may not reduce impacts per se, it will promote more refined estimates of impacts from dredging projects in the future. In so doing, concerns about potential contaminant-related impacts of dredging projects may be reduced.

B. Monitor the effectiveness of dredged material containment methods to determine whether resuspended contaminated materials are migrating into shallow water habitats.

The Service must be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats; therefore, the Service requests notification of the implementation of any conservation recommendations.

VI. REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the effects of channel deepening activities proposed by the Corps within the Arthur Kill, Kill Van Kull, and Newark Bay channels, New York and New Jersey, on the peregrine falcon. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or, (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

VII. REFERENCES

A. LITERATURE CITED

Ahlborg, U.G., A. Brouwer, M.A. Fingerhut, J.L. Jacobson, S.W. Jacobson, S.W. Kennedy, A.A.F. Kettrup, J.H. Koeman, H. Poiger, C. Rappe, S.H. Safe, R.F. Seegal, J. Tuomisto, and M. Van Den Berg. 1992. Impact of polychlorinated dibenzo-p-dioxins, dibenzofurans, and biphenyls on human and environmental health, with special emphasis on application of the toxic equivalency factor concept. European Journal of Pharmacology, Environmental Toxicology and Pharmacology Section. 228:179-199.

Ahlborg, U.G., G.C. Becking, L.S. Birnbaum, A. Brouwer, H.J.G.M. Derks, M. Feely, G. Golor, A. Hanberg, J.C. Larsen, A.K.D. Liem, S.H. Safe, C. Schlatter, F. Waern, M. Younes, and E. Yrjanheikki. 1994. Toxic equivalency factors for dioxin-like PCBs. Chemosphere 28(6):1049-1067.

Allred, P.M. and J.R. Strange. 1977. The effects of 2,4,5-trichlorophenoxyacetic acid and 2,3,7,8-tetrachlorodibenzo-p-dioxin on developing chicken embryos. Archives of Environmental Contamination and Toxicology 5:483-489.

Belton, T.J., R. Hazen, B.E. Ruppel, K. Lockwood, R. Mueller, E. Stevenson, and J.J. Post. 1985. A study of dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) contamination in select finfish, crustaceans and sediments of New Jersey waterways. New Jersey Department of Environmental Protection, Office of Science and Research, Trenton, New Jersey.

Bent, A.C. 1961. Life history of North American birds of prey. Dover Publications, Incorporated, New York, New York.

Bird, D.M., P.H. Tucker, G.A. Fox, and P.C. Lague. 1983. Synergistic effects of Aroclor 1254 and Mirex on the semen of American kestrels. Archives of Environmental Contamination and Toxicology 12:633-640.

Blazak, W.F. and J.B. Markam. 1975. Attempts to induce chromosomal breakage in chicken embryos with Aroclor 1242. Poultry Science 54:310-312.

Bopp, R.F., M.L. Gross, H. Tong, H.J. Simpson, S.J. Monson, B.L. Deck, and F.C. Moser. 1991. A major incident of dioxin contamination: Sediments of the New Jersey estuaries. Environmental Science and Technology 25:951-956.

Braune, B.M. and R.J. Norstrom. 1989. Dynamics of organochlorine compounds in herring gulls: III. Tissue distribution and bioaccumulation in Lake Ontario gulls. Environmental Toxicology and Chemistry 8:957-968.

Britton, W.M. and T.M. Huston. 1973. Influence of polychlorinated biphenyls in the laying hen. Poultry Science 52:1620-1624.

Brunstrom, B. 1988. Sensitivity of embryos from duck, goose, herring gull, and various chicken breeds to 3,3',4,4'-tetrachlorobiphenyl. Poultry Science 67:52-57.

Brunstrom, B. and L. Andersson. 1988. Toxicity and 7-ethoxyresorufin O-deethylase-inducing potency of coplanar polychlorinated biphenyls (PCBs) in chick embryos. Archives of Toxicology 62:263-266.

Brunstrom, B. and J. Lund. 1988. Differences between chick and turkey embryos in sensitivity to 3,3',4,4'-tetrachlorobiphenyl and in concentration / affinity of hepatic receptor for 2,3,7,8-tetrachlorodibenzo-p-dioxin. Comparative Biochemistry and Physiology 91C:507-512.

Brunstrom, B. and J. Orberg. 1982. A method for studying embryotoxicity of lipophilic substances experimentally introduced into hens' eggs. Ambio. 11:209-211.

Brunstrom, B. and L. Reutergardh. 1986. Differences in sensitivity of some avian species to the embryotoxicity of a PCB, 3,3',4,4'-tetrachlorobiphenyl, injected into eggs. Environmental Pollution (Series A) 42:37-45.

Cai, Z., V.M.S. Ramanujam, M.L. Gross, A. Cristini, and R.K. Tucker. 1994. Levels of polychlorinated dibenzo-p-dioxins and dibenzofurans in crab tissues from the Newark / Raritan Bay system. Environmental Science and Technology 28:1528-1534.

Cheung, M.O., E.F. Gilbert, and R.E. Peterson. 1981. Cardiovascular teratogenicity of 2,3,7,8-tetrachlorodibenzo-p-dioxin in the chick embryo. Toxicology and Applied Pharmacology 61:197-204.

Clark, K.E. 1996. Research and management of the peregrine falcon, September 1, 1994 to August 31, 1995. Unpublished Federal Aid Performance Report. New Jersey Department of Environmental Protection, Division of Fish Game and Wildlife, Endangered and Nongame Species Program, Trenton, New Jersey. 11 pp.

Custer, T.W. and G.H. Heinz. 1980. Reproductive success and nest attentiveness of mallard ducks fed Aroclor 1254. Environmental Pollution (Series A) 21:313-318.

DeGraaf, R.M. and D.D. Rudis. 1986. New England wildlife: habitat, natural history, and distribution. General Technical Report NE-108, U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station, Broomall, Pennsylvania. 491 pp.

DeGraaf, R.M., V.E. Scott, R.H. Hamre, L. Ernst, and S.H. Anderson. 1991. Forest and rangeland birds of the United States, natural history and habitat use. Agriculture Handbook 688. U.S. Department of Agriculture, Amherst, Massachusetts. 625 pp.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. The birder's handbook. Simon and Schuster, Inc., New York, New York. 785 pp.

Elliott, J.E., R.W. Butler, R.J. Norstrom, and P.E. Whitehead. 1989. Environmental contaminants and reproductive success in great blue heron (*Ardea herodias*) in British Columbia, 1986-1987. Environmental Pollution 59:91-114.

Fyfe, R., S.A. Temple, and T.J. Cade. 1976. The 1975 North American peregrine falcon survey. In U.S. Fish and Wildlife Service. 1987. Eastern peregrine falcon recovery plan, first revision. U.S. Department of the Interior, Fish and Wildlife Service, Newton Corner, Massachusetts. 35 pp. + appendices.

Harris, H.J. and D. Osborn. 1981. Effect of polychlorinated biphenyl on the survival and breeding of puffins. Journal of Applied Ecology 18:471-479.

Haseltine, S.D. and R.M. Prouty. 1980. Aroclor 1242 and reproductive success of adult mallards (*Anas platyrhynchos*). Environmental Research 23:29-34.

Helander, B., M. Olsson, and L. Reutergardh. 1982. Residue levels of organochlorine and mercury compounds in unhatched eggs and the relationships to breeding success in white-tailed sea eagles *Haliaeetus albicilla* in Sweden. Holarctic Ecology 5:349-366.

Henshel, D.S., J.W. Martin, R. Norstrom, P. Whitehead, J.D. Steeves, and P.M. Cheng. 1995. Morphometric abnormalities in brains of great blue heron hatchlings exposed to PCDDs. Environmental Health Perspectives 103, supplement 4:61-66.

Higginbotham, G.R., A. Huang, D. Firestone, J. Verrett, J. Ress, and A.D. Campbell. 1968. Chemical and toxicological evaluations of isolated and synthetic chloroderivatives of dibenzo-p-dioxin. Nature 220:702-703.

Hoffman, D.J., M.J. Melancon, J.D. Eisenmann, and P.N. Klein. 1995. Comparative toxicity of planar PCB congeners by egg injection. Society of Environmental Toxicology and Chemistry Abstracts 16:207.

Hoffman, D.J., C.P. Rice, and T.J. Kubiak. 1996. PCBs and dioxins in birds. Pages 165-208 In: W.N. Beyer, G.H. Heinz, and A.W. Redmon-Norwood (eds.). Environmental contaminants in wildlife, interpreting tissue concentrations. SETAC Publication, Lewis Publishers, CRC Press, Boca Raton, Florida.

Hoffman, D.J., M.J. Melancon, P.N. Klein, J.D. Eisemann, and J.W. Spann. 1998. Comparative developmental toxicity of planar PCB congeners in chickens, American kestrels, and common terns. Environmental Toxicology and Chemistry. (in press).

Kubiak, T.J., H.J. Harris, T.R. Schwartz, D.L. Stalling, J.A. Trick, L. Sileo, D.E. Docherty, and T.C. Erdman. 1989. Microcontaminants and reproductive impairment of the Forster's Tern on Green Bay, Lake Michigan - 1983. Archives of Environmental Contamination and Toxicology 18:706-727.

Kubiak, T.J. and D.A. Best. 1991. Wildlife risks associated with passage of contaminated anadromous fish at Federal Energy Regulatory Commission licensed dams in Michigan. U.S. Fish and Wildlife Service, East Lansing, Michigan.

Lillie, R.J., H.C. Cecil., J. Bitman, and G.F. Fries. 1974. Differences in response of caged white leghorn layers to various polychlorinated biphenyls (PCBs) in the diet. Poultry Science 53:726-732.

McLane, M.A.R. and D.L. Hughes. 1980. Reproductive success of screech owls fed Aroclor 1248. Archives of Environmental Contamination and Toxicology 9:661-665.

National Oceanic and Atmospheric Administration. 1988. A summary of selected data on chemical contaminants in sediments collected during 1984, 1985, 1986, and 1987. NOAA Technical Memorandum NOS OMA 44. U.S. Department of Commerce, National Oceanic and Atmospheric Administration. Rockville, Maryland.

______. 1995. Magnitude and extent of sediment toxicity in the Hudson-Raritan Estuary. NOAA Technical Memorandum NOS ORCA 88. U.S. Department of Commerce, National Oceanic and Atmospheric Administration. Silver Spring, Maryland.

Niimi, A.J. 1996. PCBs in aquatic organisms. Pages 117-152 In: W.N. Beyer, G.H. Heinz, and A.W. Redmon-Norwood (eds.). Environmental contaminants in wildlife, interpreting tissue concentrations. SETAC publication, Lewis Publishers, CRC Press, Boca Raton, Florida.

Nosek, J.A., S.R. Craven, J.R. Sullivan, S.S. Hurley, and R.E. Peterson. 1992. Toxicity and reproductive effects of 2,3,7,8-tetrachlorodibenzo-p-dioxin in ring-necked pheasant hens. Journal of Toxicology and Environmental Health 35:187-198.

Nosek, J.A., J.R. Sullivan, S.R. Craven, A. Gendron-Fitzpatrick, and R.E. Peterson. 1993. Embryotoxicity of 2,3,7,8-tetrachlorodibenzo-p-dioxin in the ring-necked pheasant. Environmental Toxicology and Chemistry 12:1215-1222.

Peakall, D.B. and M.L. Peakall. 1973. Effects of a polychlorinated biphenyl on the reproduction of artificially and naturally incubated dove eggs. Journal of Applied Ecology 10:863-868.

Platonow, N.S. and B.S. Reinhart. 1973. The effects of polychlorinated biphenyls (Arochlor 1254) on chicken egg production, fertility and hatchability. Canadian Journal of Comparative Medicine 37:34-325.

Risebrough, R.W. and D.B. Peakall. 1988. The relative importance of several organochlorines in the decline of peregrine falcon populations. Pages 449-462 In T.J. Cade, J.H. Enderson, C.G. Thelander, and C.C. White (eds.). Peregrine falcon populations: Their management and recovery. The Peregrine Fund, Inc., Boise, Idaho.

Skinner, L.C., R. Prince, J. Waldman, A.J. Newell, and J. Shastay, Jr. 1997a. Chemical residues in fish, bivalves, crustaceans and a cephalopod from the New York - New Jersey Harbor Estuary: Dioxins and furans. New York State Department of Environmental Conservation, Albany, New York.

Skinner, L.C., S.J. Jackling, G. Kimber, J. Waldman, J. Shastay, Jr., and A.J. Newell. 1997b. Chemical residues in fish, bivalves, crustaceans and a cephalopod from the New York - New Jersey Harbor Estuary: PCB, organochlorine pesticides and mercury. New York State Department of Environmental Conservation, Albany, New York.

Srebocan, V., J. Pomp-Gotal, V. Brmalj, and M. Plazonic. 1977. Effect of polychlorinated biphenyls (Aroclor 1254) on liver gluconeogenic enzyme activities in embryonic and growing chickens. Poultry Science 56:732-735.

Steidl, R.J. 1990. Reproductive ecology of ospreys and peregrine falcons nesting in southern New Jersey. M.S. Thesis, University of Massachusetts, Amherst.

The Peregrine Fund. 1996. The Peregrine Fund World Center for Birds of Prey, 1995 annual report, Boise, Idaho. 22 pp.

Tillitt, D.E., G.T. Ankley, J.P. Giesy, J.P. Ludwig, H. Kurita-Matsuba, D.V. Weseloh, P.S. Ross, C.A. Bishop, L. Sileo, K.L. Stromberg, J. Larson, and T.J. Kubiak. 1992. Polychlorinated biphenyl residues and egg mortality in double-crested cormorants from the Great Lakes. Environmental Toxicology and Chemistry 11:1281-1288.

Tillitt, D.E., T.J. Kubiak, G.T. Ankley, and J.P. Giesy. 1993. Dioxin-like toxic potency in Forster's tern eggs from Green Bay, Lake Michigan, North America. Chemosphere 26:2079-2084.

Tori, G.M. and T.J. Peterle. 1983. Effects of PCBs on mourning dove courtship behavior. Bulletin of Environmental Contamination and Toxicology 30:44-49.

U.S. Army Corps of Engineers. 1980. Kill Van Kull and Newark Bay channels navigation study on improvements to existing federal channels, final environmental impact statement. U.S. Army Corps of Engineers, New York District, New York, New York.

______. 1986. Feasibility report: Navigation study on improvements to existing federal navigation channels - the Arthur Kill Channel and Howland Hook Marine Terminal, Staten Island, New York; main report and environmental impact statement. U.S. Army Corps of Engineers, New York District, New York, New York.

______. 1987. Newark Bay / Kill Van Kull navigation project: Final supplement to the final environmental impact statement. U.S. Army Corps of Engineers, New York District, New York, New York.

______. 1996. Environmental scoping document: Limited reevaluation study, deepening of the Arthur Kill / Howland Hook navigation channel.
U.S. Army Corps of Engineers, New York District, New York, New York.
26 pp.

______. 1997a. Draft environmental assessment: Kill Van Kull / Newark Bay federal channels, New York and New Jersey, phase II deepening.
U.S. Army Corps of Engineers, New York District, New York, New York.
33 pp. + appendices.

______. 1997b. Biological assessment for the peregrine falcon (*Falco peregrinus*) in the area of Arthur Kill, Kill Van Kull and Newark Bay, New York and New Jersey: U.S. Army Corps of Engineers, New York District, New York, New York. 10 pp.

U.S. Environmental Protection Agency. 1993. Interim report on data and methods for assessment of 2,3,7,8-tetrachlordibenzo-p-dioxin risks to aquatic life and associated wildlife. EPA/600/R-93/055. U.S. Environmental Protection Agency, Office of Research and Development, Washington, D.C.

______. 1995. Great Lakes Water Quality Initiative criteria documents for the protection of wildlife. Office of Water, Washington, D.C. EPA/820/B-95/008.

U.S. Fish and Wildlife Service. 1976. Preliminary report on the fish and wildlife resources associated with the navigation project for Kill Van Kull and Newark Bay, New Jersey and New York. U.S. Department of the Interior, Fish and Wildlife Service, State College, Pennsylvania.
14 pp.

______. 1986. Report on the effects of the proposed navigation improvement project at the Arthur Kill Channel - Howland Hook Marine Terminal area, Staten Island, New York. U.S. Department of the Interior, Fish and Wildlife Service, Cortland, New York. 22 pp.

______. 1987. Eastern peregrine falcon recovery plan, first revision. U.S. Department of the Interior, Fish and Wildlife Service, Newton Corner, Massachusetts. 35 pp. + appendices.